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Patent Law - Computer Programs for Processing Data With a Digital Computer Cannot Be Patented Under Present United States Laws

William D. Reese

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PATENT LAW—Computer Programs For Processing Data With A Digital Computer Cannot Be Patented Under Present United States Laws.

I. INTRODUCTION

Digital computers must be supplied information in numerical form in order to perform their operations and calculations. They ordinarily operate using information which is represented by numbers in binary numerical notation, whereas man ordinarily performs arithmetic calculations using numerical information in the familiar decimal notation.\(^1\) It is thus often necessary to translate information represented by conventional decimal numbers used by man into binary numerical form in order to allow a digital computer to utilize the information. This translation or conversion is usually performed in two stages. First, decimal numbers are converted into binary coded decimal (BCD) form,\(^2\) and then the resulting BCD numbers are converted into binary form.

In 1963, Gary Benson and Arthur Tabbot filed an application in the United States Patent Office seeking to obtain a patent on a particular method for converting numerical information from one numerical base, or form,\(^3\) (BCD) into another (binary) by the use of a programmed

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1. The pure binary system of numerical notation uses only two symbols as digits (indicated by "0" and "1") whereas decimal notation uses ten symbols ("0" through "9"). In binary notation the symbols are placed in a numerical sequence with values based on powers of 2, while in decimal notation, the numerical sequence of digits indicates powers of 10. Any decimal digit from 0 to 10 can be represented in binary notation by a four digit number. Binary coded decimal numerical notation merely substitutes a four digit binary number for each digit in a decimal number. Examples of binary, decimal, and BCD notation are indicated in the following table.

<table>
<thead>
<tr>
<th>Binary</th>
<th>BCD</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>0000</td>
<td>0</td>
</tr>
<tr>
<td>0001</td>
<td>0001</td>
<td>1</td>
</tr>
<tr>
<td>0010</td>
<td>0010</td>
<td>2</td>
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<td>0011</td>
<td>0011</td>
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<td>0101</td>
<td>5</td>
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<tr>
<td>1000</td>
<td>1000</td>
<td>8</td>
</tr>
<tr>
<td>1010</td>
<td>0001</td>
<td>9</td>
</tr>
<tr>
<td>11010</td>
<td>0101</td>
<td>10</td>
</tr>
</tbody>
</table>

For a more detailed discussion of these numerical systems, consult D. EADIE, INTRODUCTION TO THE BASIC COMPUTER, 26-30 (Prentice-Hall, Inc., 1968).

2. See note 1 supra.

3. Only Claims 8 and 13 of Benson's and Tabbot's patent application were litigated on appeal. They read as follows:

8. The method of converting signals from binary coded decimal form into binary which comprises the steps of:

(1) storing the binary coded decimal signals in a reentrant shift register,
digital computer. In their patent application, they asserted that their BCD-to-binary conversion method was simpler and more accurate than methods previously used for making the BCD-to-binary translation.

The Patent Office refused to issue a patent to Benson and Tabbot on the ground that the subject matter of their invention, as defined in their claims, was not within any of the statutory classes of patentable inventions set forth in the United States patent laws. The Patent Office argued that Benson's and Tabbot's method for converting numbers, as described in their claims, included within its scope mental processes

Gottschalk v. Benson, 409 U.S. 63, 73 (1972). The claims in a patent application legally define the scope of the invention for which an applicant seeks patent protection. 35 U.S.C. § 112 (1970) specified that a patent application "shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention."

4. There are two basic types of computers: analog and digital. In analog computers, data are represented as physical quantities instead of numbers, and an analog device computer by measuring these quantities through physical analogy to the phenomenon. Examples of simple analog computers are a thermometer, a slide ruler or a mileage indicator on a car. Digital computers represent data in the form of discrete numbers or digits, instead of physical quantities. Information is represented in the various components of a computer in a form which requires only two distinct states of a storage position: "on" or "off". A digital computer contains circuitry permitting it to perform certain basic steps, called "instructions". The computer performs these operations in sequence according to a program designed by the person using the computer. A complete program usually includes instructions for introducing, coding, storing and output of data, as well as various arithmetical operations to be performed on data by the computer, such as "add" or "shift". The circuitry and mechanical apparatus used for storing one number in a computer is known as a register. A shift register is a register within which a number may be reoriented by a circular permutation. D. Eadie, Introduction to the Basic Computer 4-8 (Prentice-Hall, Inc., 1968).


and mathematical steps which, the Patent Office maintained, were unpatentable. On appeal to the Court of Customs and Patent Appeals (hereinafter CCPA), the decision of the Patent Office was reversed. The sequence of steps described by the inventors' claims was found to be within the useful, technological arts and, therefore, patentable as a "process" under the patent laws. The Supreme Court granted certiorari and reversed.

Justice Douglas, writing for a unanimous court with three justices abstaining, held that Benson's and Tabbot's invention was not patentable under the United States patent laws. Describing as settled the principle that ideas, per se, are not patentable, the Court found that granting Benson and Tabbot a patent on all the uses of their BCD-to-binary conversion method in digital computers would, in effect, give them a patent on the idea, or algorithm, embodied in their method, since the only practical use for the algorithm would be in digital computers. While confining the express basis for its decision to this relatively narrow ground, the Court also stated that innovations in the technology of processing data in digital computers are not patentable under the present patent statute. The United States Constitution delegates to Congress the power to grant inventors a limited monopoly on their discoveries in order to promote the progress of the useful arts, i.e., the progress of technology. Through the present patent laws, enacted in 1952, Congress has exercised the power to authorize patent monopolies. In sections 100(b) and 101 of Title 35, Congress has defined the categories of discoveries and inventions for which patents may presently be granted. While data processing methods could be

35 USC § 100(b) provides:
The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.

35 USC § 101 provides:
Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

1. In re Benson, 441 F.2d 682 (C.C.P.A. 1971).
2. Id. at 688.
6. 409 U.S. at 73.
7. "[Congress shall have power] . . . To promote the Progress of Science and useful Arts by securing to . . . Inventors the exclusive Right to their . . . Discoveries," U.S. Const. art. I, section 8.
8. "The phrase 'technological arts' . . . is synonymous with the phrase 'useful arts' as it appears in Article I, section 8 of the Constitution." In re Waldbaum, 457 F.2d 997, 1003 (C.C.P.A. 1972).
10. 35 U.S.C. §§ 100(b), 101, quoted in note 6, supra.
made patentable, the Court stated, they are not protected by the present patent laws, and further legislation would be required to afford them patent protection if this were desired by Congress. The decision of the Court implies that the scope of protection provided by the present patent statute is significantly narrower than is permitted by the Constitutional delegation of power to Congress.

II. PATENT PROTECTION FOR COMPUTER PROGRAMS

Commercial digital computer technology made a relatively sudden appearance in the United States shortly after the present patent laws were enacted in 1952. Since then, the digital computer industry has experienced surprisingly rapid economic growth and unprecedented technological innovation and development. The novel technology of the computer industry has raised difficult questions for the Patent Office and the courts. The patentability of digital computing machinery (herein broadly termed “hardware”) has never been questioned; however, the possible applicability of the patent laws to computer programs and techniques for solving particular problems with general purpose computers (herein broadly termed “software”) has generated extensive discussion and speculation. In the earlier stages of the computer industry's economic and technological development, innovations in mechanical, “hardware”, aspects of the industry were of predominant importance. Later, as rapid developments continued, techniques for using computers to solve problems, the “software” aspect of computer technology, became increasingly important. Eventually, the amount of research and development devoted to software and the rate of capital investment in software surpassed the rate of research and

17. 409 U.S. at 73 (1972).
19. By 1972 over 165,000 computer systems made by American-based companies are reported to be in use, with a cumulative value of $49.8 billion. Id. at 9.
20. See Woodcock, Mental Steps and Computer Programs, 52 J. PAT. OFF. SOC'Y 275 (1970), which contains a bibliography of 54 articles concerning the patentability of computer programs as of May, 1970.
21. “Hardware is the mechanical, magnetic, electronic and electrical devices from which a computer is fabricated.” COMPUTERS AND THE LAW, 127 (R. Bigelow ed. 1966).
23. “Software” is a term used to describe sets of instructions given to computers and is broadly synonymous with “computer programs”. COMPUTERS AND THE LAW, 124 (R. Bigelow ed. 1966).
24. See note 20, supra.
investment in hardware.\(^2\) As the technical and financial importance of software increased and actually began to exceed the importance of hardware, the developers and vendors of software were understandably eager to obtain some type of legal protection for their investments and innovations.\(^2\) Hardware is manufactured by giant corporations such as International Business Machines Corp. The software industry, in contrast, is made up primarily of small specialized organizations.\(^2\)

Legal protection for a proprietary interest in technology is generally considered to be available through three different legal systems, the patent laws, state trade secret laws, and the copyright laws.\(^2\) Protection of computer programs under the patent laws has been favored by those whose primary concern is development and sales of software, because of the relatively broad and definite scope of the protection afforded.\(^2\)

On the other hand, patenting of computer programs has been strongly opposed by the giant hardware manufacturers such as International Business Machines Corp., who are anxious to preserve unrestricted the use of computing machines purchased from them.\(^2\) Trade secret protection for software was felt by software developers to have several drawbacks. First, since trade secret protection is only available under state laws, there would be a variety of requirements in different states and state law could not readily be employed to protect the technology of the computer industry, which is national in character.\(^2\) Second, since the object of the trade secret laws is to maintain technology on a confidential basis, the dissemination and industry-wide utilization of advances in software technology would be severely hampered, and this would tend to retard further development.\(^2\) Further, recent Supreme Court decisions have left the scope of protection afforded by trade secret laws on a somewhat questionable level.\(^2\)

Printed computer pro-

\(^{26}\) Id. at A-35.
\(^{27}\) Id. at A-39.
\(^{28}\) Brief for the Association of Data Processing Service Organizations, Software Products and Services Section as amicus curiae at 6, Gottschalk v. Benson, 409 U.S. 63 (1972).
\(^{29}\) COMPUTERS AND THE LAW 90-93 (R. Bigelow ed. 1966).
\(^{30}\) A patent is a grant of the right to preclude others from making, using or selling a claimed invention for 17 years. 35 U.S.C. § 154 (1970).
\(^{33}\) See Bender, Computer Programs: Should They Be Patentable, 68 COLUM. L. REV. 241 (1968).
grams had been accorded copyright protection by 1964, but the limited proprietary protection offered by the copyright laws was felt by software developers to be insufficient to protect their interests. Accordingly, they continued to seek the broader protection afforded by the patent system.

In 1966, the Patent Office published proposed guidelines for the examination of computer programs in its Official Gazette. The proposed guidelines distinguished between two kinds of processes, one of which was patentable, while the other was not. The type of process which was not patentable was described as an "algorithm" process. In contrast, a patentable process was termed a "utility" process in the guidelines.

To distinguish between algorithm and utility processes becomes difficult in the case of a programmed general purpose computer unless the distinction between a result of method or apparatus operation and the function of the method steps or apparatus component is maintained.

The result of a programmed operation of a computer may be the mathematical transformation of data according to an algorithm but the functioning of a computer is the change in state of certain electrical or mechanical devices within the computer according to

36. Copyright protects only the form of expression of an idea in a published work and not the idea itself. It will protect against outright copying, but not against a subsequent original work utilizing the same idea. See, e.g., White-Smith Music Publishing Co. v. Appolo Co., 209 U.S. 1 (1908); Baker v. Selden, 101 U.S. 99 (1879).
40. Special problems of patentability arise in the computer, data processing and automatic control field that revolve around mathematical processes and equations. These problems may be more generically stated as the broad field of algorithms which are conclusions based upon a precise or mathematical premise or line of reasoning.

For example the prediction as to the winner in a presidential election made by a programmed 'general purpose' computer is based on an algorithm which has been evolved from a line of reasoning based on known factors and is analogous to the mathematical formula. Similarly, business practices or methods may be reduced to an algorithm.

Mathematical process discoveries and mathematical formulas used therein may not be patented although they may be of enormous importance (e.g., \( e = mc^2 \)).

Mathematical formulas are not included within 35 U.S.C. § 101 since they are not a process, a machine, a manufacture, a composition of matter, or useful improvements thereof.

Thus certain useful and important processes are non-statutory as being merely expressions of an algorithm. . . ." Id. at 865.
41. "...[O]ther useful processes are statutory since they deal with tangible things and substances." Id. at 865.
the algorithm, as distinguished from the individual or total computational result of the components thereof.

Thus a process, defined as a series of steps for the manipulation or evaluation of data, even though it is required to be carried out by a programmed computer, would be an algorithm process. A process defined as a series of steps for causing a sequence of changes in state of components of the computer, even though the sequence is dictated by an algorithm, would be a utility process.42 The “mere inclusion of algorithm steps” in a patentable utility process would not, according to the guidelines, render the utility process unpatentable, “since the algorithm may illuminate or exemplify the utility steps in the process.”43

After a hearing on the proposed guidelines,44 the Patent Office adopted guidelines, in 1968, which stated specifically that computer programming, per se, whether defined in the form of a process or apparatus, was not patentable.45 The legal theories set forth in the adopted guidelines as support for the position of the Patent Office were that processes which could be implemented by purely mental acts were not covered within the scope of patentable subject matter as defined in the patent statute,46 and that a process or method was directed to patentable subject matter only if it was performed on physical materials and produced some appreciable change in their character or condition.47 A computer programming process, unless combined with physically implemented steps, was not covered by the patent statute.48

Another factor, which undoubtedly influenced the Patent Office in making its administrative decision against issuing patents for computer programs, was not mentioned in the guidelines. Evaluation of inventions in the light of already known technology, in order to prevent the

42. Id. at 865-66.
43. "Where a process is a combination of algorithm and utility steps, its patentability is measured by viewing the process as a whole against the background of the prior art . . . to determine whether the process is characterized solely by the algorithm." Id. at 866.
44. A hearing on the proposed guidelines was held on October 4, 1966. 855 OFF'FL GAZETTE OF THE U.S. PAT. OFF. 829 (1968).
45. "The basic principle set forth in the foregoing guidelines is that computer programming, per se, whether defined in the form of process, or apparatus, shall not be patentable." Id. at 830.
46. "Mental processes may not be patented although they may be of enormous importance . . ." Id. at 829.
47. "A process or method is directed to patentable subject matter only if it is performed on physical materials and produces some appreciable change in their character or conditions . . ." Id. at 829.
48. " . . . A computer programming process which produces no more than a numerical, statistical or other informational result is not directed to patentable subject matter. Such a process may, however, form a part of a patentable invention if it is combined in an inobvious manner with physical steps . . . as, for example, in the knitting of a pattern or the shaping of metal." Id. at 830.
patenting of information in the public domain, is a mandatory pre-
requisite to the issuance of a patent by the Patent Office under the patent
statute and case law.\textsuperscript{49} In 1966, the President's Commission on the
Patent System made a finding that the Patent Office lacked adequate
methods and facilities for classifying computer programs and for com-
paring them with already known technology.\textsuperscript{50} At the time the Patent
Office guidelines declaring programs to be unpatentable were adopted in
1968, the lack of methods and facilities had apparently not changed.\textsuperscript{51}
As of 1973, six years after study of the problem began, difficulties
persisted, and the Patent Office still considered its facilities to be in-
adequate for the task of examining computer program applications.\textsuperscript{52}

Beginning in 1968, the CCPA decided a number of appeals from
Patent Office actions which involved digital computers.\textsuperscript{53} In this series of
cases, Patent Office decisions denying patents for inventions involving
digital computers were almost uniformly reversed by the CCPA. The
decisions in these cases severely undermined the legal arguments asserted
by the Patent Office as the basis for its denial of patents for data process-
ing computer programs.\textsuperscript{54} Since the issuance of a patent is mandatory
when the patent applicant complies with the patent statute, the Patent
Office was necessarily required to provide a legal basis for its refusal
to grant patents on computer programs.\textsuperscript{55} The series of reversals by

\begin{footnotesize}
50. Uncertainty now exists as to whether the statute permits a valid patent to
be granted on programs. Direct attempts to patent programs have been
rejected on the ground of nonstatutory subject matter . . . .
The Patent Office now cannot examine applications for programs because of the
lack of a classification technique and the requisite search files. Even if these
were available, reliable searches would not be feasible or economic be-
cause of the tremendous volume or prior art being generated. Without this
search, the patenting of programs would be tantamount to mere registration
and the presumption of validity would be all but nonexistent. "To Promote
The Progress of Useful Arts," \textit{The 1966 Report of the President's Com-
mission on the Patent System} (reprinted in S. Doc. No. 5, 90th Cong., 1st
Sess. p. 21).
52. "At present there is no adequate system of classification, searching technique and
research files for computer programming. Consequently, it is highly doubtful whether
the criteria for examination of patent applications required by \textit{Graham v. John Deere}
Co. . . . can be effectively applied to applications for patents on computer programs."
53. In re Foster, 438 F.2d 1011 (C.C.P.A. 1971); In re Musgrave, 431 F.2d 882
(C.C.P.A. 1970); In re Mahoney, 421 F.2d 742 (C.C.P.A. 1970); In re Bernhart, 417
F.2d 1395 (C.C.P.A. 1969); In re Prater, 415 F.2d 1378 (C.C.P.A. 1968); \textit{modified on
54. "One of the many sound ideas expressed in the concurring opinion delivered by
Judge Baldwin in \textit{Musgrave} is 'that in reality very little remains as a result of our
recent decisions of the 'mental steps' doctrine.'" In re Benson, 441 F.2d 682, 687
\end{footnotesize}
the CCPA effectively removed the legal basis for the Patent Office's guidelines, and formed the primary basis for the CCPA's holding in *In re Benson* that data processing computer programs were patentable processes under 35 USC §101. The Patent Office, in its published guidelines and in its administrative actions denying patents for computer programming inventions, had relied on earlier cases decided by the CCPA, *In re Abrams,* and *In re Yuan,* as authority for refusing to grant patents on processes which could be performed by mental acts.

The CCPA, in *In re Prater,* interpreted the decisions in *Abrams* and *Yuan* narrowly, as prohibiting a patent grant only in cases where no mechanical apparatus whatsoever was described in the patent application as a means for performing the process sought to be patented, thereby leaving mental acts the only apparent way in which the process described in such an application could be performed. A process could be patent-

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56. "The same line of cases is relied on here (by the Patent Office) that was relied on in *Prater* and *Musgrave* and we have given them full consideration before, particularly in those two cases . . . ." In re Benson, 441 F.2d 682, 687 (C.C.P.A. 1971).

57. Id. at 688.


59. See generally the discussions of Patent Office rejections in the C.C.P.A.'s opinions in the cases cited in note 53, supra.

60. Abrams sought to patent a petroleum prospecting method which included steps for "measuring", "determining", and "comparing". The C.C.P.A. found that the only technological advance in the claimed method resided in these steps, which were said to be purely mental. The C.C.P.A. affirmed the rejection of the claimed method by the Patent Office. "Citation of authority in support of the principle that claims to mental concepts which constitute the very substance of an alleged invention are not patentable is unnecessary. It is self-evident that thought is not patentable." In re Abrams, 188 F.2d 165, 168 (C.C.P.A. 1951).

61. Yuan attempted to patent a method for determining the exact airfoil profile most desirable for certain aerodynamic characteristics, which was to be used in designing a high speed airfoil, according to certain mathematical relationships and procedures. The C.C.P.A. affirmed the Patent Office's rejection, stating that "purely mental steps do not form a process which falls within the scope of patentability as defined by statute." In re Yuan, 188 F.2d 377, 380 (C.C.P.A. 1951).

62. "Purely mental steps" are considered to be steps which may only be performed in, or with the aid of, the human mind. This is quite in contrast to 'purely physical steps' which may only be performed by physical means, machinery, or apparatus. Purely mental steps (e.g., 'believing') are quite different from purely physical steps (e.g., 'heating') in many respects, not the least of which is that the former are much less susceptible to specific definition or delineation. Between the purely mental and purely physical ends of the spectrum there lies an infinite variety of steps that may be either machine-implemented or performed in, or with the aid of, the human mind (e.g., 'comparing' and 'determining'). In ascertaining whether a particular step is 'mental' or 'physical' each case must be decided on its own facts, considering all of the surrounding circumstances, to determine which end of the spectrum that step is nearer. It may well be that the step of 'comparing' may be 'mental' in one process, yet 'physical' in another.


64. Abrams had disclosed no means whatever for performing, without human intervention, two claimed steps of calculation and comparison . . . . Thus Abrams disclosed and claimed a process which could only be performed in the
able under the standards of 35 USC §101, held the CCPA in Prater, even though it could be performed by mental acts, as long as mechanical means for performing the process was disclosed in the patent application. In addition, the CCPA required that mental implementation of the process must be unreasonable in light of the description of the invention and the scope of the claims in the patent application. The Patent Office had relied on the authority of In re Yuan and Cochrane v. Deener to assert, in the guidelines, that a process, in order to be patentable, must be performed on physical materials and must produce some appreciable change in their character or conditions. The CCPA discussed Cochrane v. Deener in its decision in Prater, and held that Cochrane had been misconstrued in previous decisions, and did not actually hold that processes must operate physically on substances in order to be patentable. The actual intent of the opinion in Cochrane had been, according to the CCPA, to extend the scope of the process category of patentable inventions and to point out that a process is not limited to any particular mechanical means used in performing it. In re Prater thus rendered doubtful the adequacy of the legal arguments employed by the Patent Office in its guidelines in order to maintain its policy of refusal to grant patents for computer programs.

In a subsequent decision, In re Musgrave, the CCPA went further toward eroding the legal basis for the Patent Office's policy. In an ad-

mind insofar as the teachings of the application were concerned.

... 'Yuan's disclosure was the use made of equations by pencil-and-paper with the mind of the operator at work to interpret the results.' ... [A]s in Abrams, insofar as the disclosure was concerned, the process (or the critical step thereof) was one that required the use of the human mind—indeed, a purely mental process or step. 

Id. at 140.

65. "Disclosure of apparatus for performing the process without human intervention may make out a prima facie case that the disclosed process is not mental and is, therefore, statutory." Id. at 1402 n.22.

66. As a result of Prater and Mahoney—if, indeed, it has not always been so—there is a 'standard of reasonableness' in the interpretation of claims which is that they should be given the meaning they would have 'to one of ordinary skill in the pertinent art when read in light of and consistently with the specification.' The question ... is ... would a reasonable interpretation of the claims include coverage of the process implemented by the human mind?

In re Benson, 441 F.2d 682, 687 (C.C.P.A. 1971).

67. 188 F.2d 377 (C.C.P.A. 1951).

68. "A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing." Cochrane v. Deener, 94 U.S. 780, 788 (1876).


71. See note 69, supra.

ministrative action prior to the CCPA's *Prater* opinion, the Patent Office had refused to issue a patent to Musgrave for a process using a digital computer. The sole reason given by the Patent Office in denying Musgrave a patent was that one or more steps in the process he claimed could be performed by mental acts, so that the process did not fall into one of the categories of patentable inventions set forth in 35 USC § 101.73 On appeal, the CCPA reversed, stating:

We cannot agree . . . that these claims (all of which can be carried out by the disclosed apparatus) are directed to non-statutory processes merely because some or all the steps therein can also be carried out in or with the aid of the human mind or because it may be necessary for one performing these processes to think. All that is necessary, in our view, to make a sequence of operational steps a statutory "process" within 35 USC § 101 is that it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of "useful arts." Constitution article 1 section 8.74

The Patent Office had refused to issue a patent to Musgrave solely on the basis, discredited in the interim by the CCPA's decision in *Prater*, that the subject matter of Musgrave's invention could be performed mentally, although Musgrave in his application for a patent, had disclosed a machine with which to perform his process.75 The decision of the Patent Office in *Musgrave* could thus have been reversed by the CCPA solely on the authority of its opinion in *Prater*,76 without further eroding the legal position of the Patent Office. The CCPA's reversal in *Musgrave*, however, was based on a significantly broader rationale than was stated in *Prater*.77 In *Musgrave*, the CCPA essentially held that any sequence of steps qualifies as a "process" and is therefore patentable subject matter under 35 USC § 101, if the sequence of steps serves to promote the useful arts, and found that any sequence of steps which could be performed by a machine, as opposed to a thinking human being, was within the useful arts.78 The CCPA's decisions in *Prater*,79 *Musgrave*,80 and the other cases involving digital computers, relegated to complete insignificance the idea that computer programs might be unpatentable as algorithms or mathematical steps, except to the extent that algorithms and mathematical formulae could be considered synony-

73. *Id.* at 885-86.
74. *Id.* at 893.
75. *Id.* at 893.
76. 415 F.2d 1393 (C.C.P.A. 1969).
77. *See* In re Waldbaum, 457 F.2d 997 (C.C.P.A. 1972); In re McIlroy, 442 F.2d 1397 (C.C.P.A. 1971).
mous with so-called mental steps or acts. The issues discussed at length by the CCPA and the Patent Office in the series of digital computer cases were related to the so-called mental steps doctrine. These cases were concerned primarily with the difficulties inherent in attempting to describe and claim data processing methods without also claiming mental acts. Mental acts were considered to be outside the scope of patent protection. The thrust of the digital computer cases was to develop a workable approach to the proper description and claiming of inventions involving digital computers. The criterion established was that, when a claimed process, reasonably interpreted, included only machine (non-mental) acts, then the claimed process was covered by the "process" category of patentable inventions. The critical feature, in the CCPA's analysis, was claiming a method which could be performed by a machine, as opposed to a method which could be performed using the mental processes of a human being. The Patent Office effectively withdrew its guidelines after its legal arguments had been undermined, and began to examine computer program patent applications.

III. THE CCPA'S DECISION IN BESON

When the claims for the programming invention of Benson and Tabbot reached the CCPA on appeal from their final denial by the Patent Office, only one ground for the denial of a patent had been properly maintained. Thus, the issues discussed in previous cases as to the proper scope of the inventor's claims were eliminated from review. The only issue remaining contested by the Patent Office was whether the subject matter of the applicants' invention, as set forth in their claims, was covered by one of the statutory categories of patentable inventions listed in 35 USC § 101. Judge Rich, writing for the CCPA, pointed out what may now be an important feature of Benson's and Tabbot's process distinguishing it from the inventions claimed by the applicants.

81. See generally cases cited in note 53, supra.
83. See In re Benson, 441 F.2d 682, 687 (C.C.P.A. 1971).
84. See In re Prater, 415 F.2d 1393 (C.C.P.A. 1968).
85. See generally Iandorio, Which Wei Did They Go, 53 J. PAT. OFF. Soc'y 712 (1971).
88. See In re Benson, 441 F.2d 682, 686 (C.C.P.A. 1971).
in Prater and other previously decided cases involving digital computers.\footnote{In re Foster, 438 F.2d 1011 (1971); In re Musgrave, 431 F.2d 882 (1970); In re Mahoney, 421 F.2d 742 (1970); In re Bernhart, 417 F.2d 1395 (1969); In re Prater, 415 F.2d 1393 (1969).} In Benson's and Tabbot's patent application, they had stated that their invention related "to the processing of data by program." Accordingly, the CCPA expressly found that the invention was "directed solely to the art of data processing itself, whereas in most of the above cases\footnote{See cases cited in note 91, supra.} some subsidiary or additional art was involved."\footnote{In Benson, 441 F.2d 682, 686 (C.C.P.A. 1971).} The CCPA had little trouble determining that Claim 8 of the application was patentable, since it was limited to the use of physical computer apparatus, a shift register.\footnote{See cases cited in note 91, supra.} Under the decisions in Prater and Musgrave, this limitation was clearly sufficient to bring the claimed process within the useful arts, and to obviate the objection raised by the Patent Office that Claim 8 covered mental acts.\footnote{Id. at 687.} In its opinion in Benson, the CCPA found that "a reasonable interpretation of the claims" (emphasis the court's) would not include coverage of the claimed process as implemented by the human mind, and broadly indicated that data processing programs were patentable subject matter under the patent laws, stating:

The solicitor would have us hold the method is not a "process" within section 101 on the ground that a programmable computer is merely a "tool of the mind" and the method is basically "mental" in character, apparently because the "work stuff" of the method is numbers which are mathematical abstractions. As the Patent Office would say, we do not find the argument persuasive.\footnote{Id. at 688.}

The other claim on review in Benson, Claim 13, was asserted by the CCPA to have "no practical use other than the more effective operation and utilization of a machine known as a digital computer" (emphasis the court's).\footnote{See cases cited in note 91, supra.} The characterization eliminated the problems which had troubled the Patent Office and the CCPA in previous cases\footnote{See cases cited in note 91, supra.} as to the possible inclusion of mental acts within the description and claiming of an invention. The CCPA reasoned that digital computers are obviously within the useful arts, and that a process having
no practical value other than enhancing the internal operation of a digital computer would also, of necessity, fall within the scope of the useful arts and would therefore be patentable as a process under section 101.99 This assertion was made, apparently, on the authority of the CCPA's holding in Musgrave that any sequence of steps which advances the useful arts is a patentable process.100 When the Supreme Court granted certiorari in Benson, the only question for review, then, was whether the method described and claimed by Benson and Tabbot was a "process" within the meaning of the patent statute.101

IV. THE SUPREME COURT DECISION

In an opinion written by Justice Douglas, the Supreme Court characterized Benson's and Tabbot's computer programming method as basically an algorithm for converting numbers from BCD notation into binary notation. An algorithm, according to the Court, was a generic procedure for solving a given type of mathematical problem. From the generic algorithm for which Benson and Tabbot sought a patent, the Court asserted, specific computer programs could be developed for any desired application. What the Court found fatally absent from the claimed process was just such an application of the algorithm which characterized the invention to a particular new and useful end. The algorithm, as claimed, lacked a sufficient relationship with tangible physical results, which was necessary, in the Court's view, in order to differentiate a patentable process from an unpatentable mathematical formula or algorithm. In the absence of any particular substantial, practical application to a useful end (which, the Court apparently assumed, could not include information processing in a digital computer), the claimed process was merely an abstract mathematical formula.102

Here the "process" claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure-binary conversion. The end use may (1) vary from the operation of a train to verification of drivers' licenses to researching the law books for precedents and (2) may be performed through any existing machinery or future-devised machinery or without any apparatus.103

The Court also cited its decisions construing the meaning of the "process"
category of inventions, all of which were decided under previous patent statutes which had been superseded by the enactment of the 1952 patent laws, but the Court did not appear to find a conclusive answer in the cases to the question whether the “process” category was sufficiently broad to include computer programs. Notably, the Court expressly disclaimed any intention to prohibit, by its decision, the patenting of computer programs in general. In an apparent attempt to make clear the narrow scope of the actual holding intended by the Court, Justice Douglas tried to pinpoint the essential flaw in the particular method claimed by Benson and Tabbot:

What we come to is the following. . . . The mathematical formula involved here has no substantial application except in connection with a digital computer which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.

It may be that the patent laws should be extended to cover these programs, a policy matter to which we are not competent to speak.

The argument employed by the Court in this section of the opinion may indicate the point at which it actually disagrees with the reasoning employed by the CCPA in its opposite decision. The Court apparently is in agreement with that portion of the CCPA’s opinion in *In re Benson* in which it held that methods “having no practical value other than enhancing the internal operation” of digital computers are “in the technological or useful arts.” For if the Court disagrees with this assertion, its express declaration that the patent laws can be extended to cover these methods would be meaningless, since Congress apparently does not possess the power, under article 1 section 8 of the Constitution,

106. 35 USC § 1 et seq. (1970).
107. It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a ‘different state or thing.’ We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents. Gottschalk v. Benson, 409 U.S. 63, 71 (1972).
108. It is said that the decision precludes a patent for any program servicing a computer. We do not so hold.

*Id.* at 71.
109. *Id.* at 71.
to extend coverage of the patent laws to create monopolies on abstract intellectual concepts and mental acts. Rather, the Supreme Court evidently intended, by its holding in *Gottschalk*, to declare merely that a statutory "process", as defined in 35 USC §§ 100(b), 101, does not have a sufficiently broad scope to cover every "sequence of operational steps which is in the technological arts so as to be in consonance with the constitutional purpose to promote the progress of useful arts", as asserted by the CCPA. In other words, the Supreme Court seemed to be implying in its opinion, that it is within the power of Congress to extend patent protection to methods for processing numerical information in programmed digital computers, but that Congress did not intend to protect such methods under the present patent laws.

The basis for its decision, as explicated by the Court in *Gottschalk v. Benson*, is obscured by several ambiguities which will inevitably render difficult the future application of the decisional rationale. Nevertheless, two points are discernible which may affect future cases. First, a method for solving a given type of mathematical problem is not patentable. Second, methods for using a digital computer to solve a given type of mathematical problem are not presently patentable under the United States patent laws. One troubling aspect of the Court's opinion is its failure to differentiate between these two features of the holding, and between the two corresponding, and distinctly different, conceptions under which particular inventions may be unpatentable. On one hand, scientific truths, natural phenomena, mental processes and abstract intellectual concepts are apparently unpatentable in what might be called a constitutional sense and thus cannot be defined as patentable by Congress, since these abstracts concepts are basic tools used by all persons in science and research, and their monopolization would presumably not promote the useful arts. On the other hand, there are, or may be, certain discoveries and inventions which are not proscribed from patent protection under this broad constitutional limitation, yet

112. 35 U.S.C. §§ 100(b), 101 are quoted in note 6, supra.
114. See text accompanying note.
115. "... [I]f the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself." 409 U.S. at 72.
116. "It may be that the patent laws should be extended to cover these programs ..." *Id.* at 72.
119. See note 111, supra.
are still not patentable because they are not covered by one of the specific categories of patentable inventions enumerated and defined by Congress in the present patent statute.\textsuperscript{120} Under the Court's analysis in the opinion, the method claimed by Benson and Tabbot is unpatentable because a patent on their method would be "in practical effect" a patent on an idea, and thus prohibited from patentability in the constitutional sense. Yet the Court also suggests that "it may be that the patent laws should be extended to cover these programs . . ."\textsuperscript{121} Nowhere does the Court explain why a patent cannot be granted "in practical effect" on an abstract idea under the present patent statute, but that it would be somehow perfectly correct to grant a patent on the same idea, "in practical effect", under some other patent statute. Moreover, the "in practical effect" reasoning employed here by the Court to deny a patent to Benson and Tabbot would seem to contradict a principle announced by the Court in the \textit{Telephone Cases}.\textsuperscript{122} In that group of cases, Alexander Graham Bell successfully sought to enforce his patent on a process for transmitting vocal and other sounds by varying the electrical current in a circuit.\textsuperscript{123} In upholding Bell's patent, Chief Justice Waite stated:

It may be that electricity cannot be used at all for the transmission of speech except in the way Bell has discovered, and that, therefore, practically, his patent gives him its exclusive use for that purpose, but that does not make his claim one for the use of electricity distinct from the particular process with which it is connected in his patent. It will, if true, show more clearly the great importance of his discovery, but it will not invalidate his patent.\textsuperscript{124}

In other words, the fact that Bell's patented process might, in practical effect, give him an exclusive monopoly on the use of a natural phenomenon, electricity, for a particular purpose was deemed irrelevant by the Court. What is true for a patented process employing a natural phenomenon, electricity, would seem also to be true for a process such as Benson's and Tabbot's which employs a mathematical formula or algorithm.

The Court also faulted the programming invention claimed by Benson and Tabbot because their process did not provide what the Court felt was a new and useful result. On the authority of \textit{Cochrane v. Deener},\textsuperscript{125} the Court's opinion stated that "transformation and reduction of an

\begin{itemize}
  \item \textsuperscript{120} 35 U.S.C. §§ 100(b), 101, quoted in note 6, \textit{supra}.
  \item \textsuperscript{121} 409 U.S. at 72.
  \item \textsuperscript{122} 126 U.S. 1 (1887).
  \item \textsuperscript{123} \textit{Id}.
  \item \textsuperscript{124} \textit{Id}. at 535.
  \item \textsuperscript{125} 94 U.S. 780 (1876).
\end{itemize}
article to a different state or thing is the cue to the patentability of a process claim that does not include particular machines."\textsuperscript{126} This statement in the opinion is not easy to reconcile with the Court's holding in the \textit{Telephone Cases}, decided some twenty years after \textit{Cochrane}, that a process for varying the electrical current in a circuit may be patented.\textsuperscript{127} Resolution of any apparent conflict may not be necessary, however. Having thus unambiguously stated that a process must either transform an article to a different state or must involve a particular machine, the Court then went on in the opinion to muse that "It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing"\textsuperscript{128} (emphasis added). Speculation as to the import of these two statements from the opinion, when taken together, is relatively fruitless, for the Court giveth and the Court then taketh away. Such word play in the opinion gives rise, in effect, to a non-holding which lacks firm meaning and has little value as precedent. Perhaps the Court intended thereby to maintain a broad flexibility in its approach to the question of patenting computer programs, the better to defer to any expression of Congressional intent should Congress respond to the Court's overt solicitations in the opinion.\textsuperscript{129}

\section*{V. Conclusion}

What effect will the Supreme Court's opinion in \textit{Gottschalk v. Benson}\textsuperscript{130} have on the patentability of computer programs in general? Presumably, a petition for certiorari was filed by the Patent Office in \textit{Benson v. Gottschalk} in order to settle a controversy which the Patent Office considered to be of more than ordinary importance with respect to the patenting of computer programs. It may also be concluded, from the large number of amicus briefs filed with the Court\textsuperscript{131} by computer manufacturers, program developers and legal organizations, that there was a widely held presumption that the decision in this case would largely settle the important question of the patentability of "software" under the present patent laws. The practical importance of \textit{Gottschalk} in the future, if indeed it has any, clearly will be found in the extent to which arguments employed by the Court in order to deny a patent to

\begin{thebibliography}{10}
\item\textsuperscript{126} Gottschalk v. Benson, 409 U.S. 63, 70 (1972).
\item\textsuperscript{127} Id. at 1,534.
\item\textsuperscript{128} 409 U.S. at 71.
\item\textsuperscript{129} "If these programs are to be patentable, considerable problems are raised which only committees of Congress can manage. . . ." \textit{Id}. at 73.
\item\textsuperscript{130} \textit{Id}.
\item\textsuperscript{131} \textit{Id}. at 63.
\end{thebibliography}
Benson and Tabbot can be broadened to deny patents for digital computer programs in general. The Court expressly stated that its holding was not intended to bar patents on all computer programs. At the same time, the Court implied that a class of programs is unpatentable.\textsuperscript{132} The unpatentable programs apparently are those which are not restricted to use as part of an overall process having some useful end aside from transformation of data in a computer. The Court seemed to fault Benson’s and Tabbot’s process because it did not have what the Court felt was a sufficient end use, and because the process would, if patented, in practical effect, monopolize a mathematical formula. It may be concluded that the Court intended to hold unpatentable, in general, any method for using a digital computer to process data when the only utility relied upon is the facilitation of the data processing itself. The processes found patentable by the CCPA in cases decided prior to \textit{Gottschalk v. Benson} generally utilize the processing of data in a digital computer as only a part of the process, while the processes themselves, in these cases, were directed to end uses which the Supreme Court would apparently find sufficiently concrete.\textsuperscript{133} Thus, \textit{Gottschalk} can be sufficiently distinguished to allow the previously decided computer programming cases to remain partially vital. The combination, in the opinion in \textit{Gottschalk}, of broad language as to the unpatentability of “these programs”, balanced with the Court’s expressly narrow decisional rationale, will leave the courts great leeway for flexible interpretation of any future legislative action as to computer program protection.

\textbf{William D. Reese}

\textsuperscript{132} \textit{Id.} at 72.
\textsuperscript{133} See text accompanying note 103, \textit{supra}.