Gottschalk v. Benson—The Supreme Court Takes a Hard Line on Software

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NOTES AND COMMENTS

GOTTSCHALK v. BENSON—THE SUPREME COURT TAKES A HARD LINE ON SOFTWARE

INTRODUCTION

Both the American patent system and the technology it has fostered have come a long way since 1641 when the first patent to issue on this continent was granted by the Massachusetts General Court. It is most unlikely that, when George Washington appeared before the second session of the First Congress to urge passage of a patent bill, he or any of the attending legislators considered the implications of patent protection for computer software. Subsequent revisions of the Patent Act, through the currently applicable 1952 version, have not expressly addressed that issue. The most thorough study of the matter to date, that of the President’s Commission on the Patent System, called for statutory exclusion of computer programs from the protected subject matter contemplated by the Patent Act, but this recommendation has failed to win congressional approval. Thus, the burden of establishing policy in this area of the law has, by default, been thrust upon the courts.

The recent case of Gottschalk v. Benson represented the Supreme Court’s first opportunity to grapple with the issue of software patentability. The 6-0 decision reversed a unanimous Court of Customs and Patent Appeals (CCPA) and refused to grant patent protection to a

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1 In 1641, Samuel Winslow received this first American patent for a new method of making salt. Unlike today’s patents which are routinely issued under the patent laws, a colonial patent like Winslow’s was only granted following a special appeal by the inventor to his colony’s governing body. Pharmaceutical Manufacturers Ass’n, The Story of the United States Patent Office at iv (1965).

2 On January 28, 1790, President Washington stated to the Congress:
I cannot forbear intimating to you the expediency of giving effectual encouragement as well to the introduction of new and useful inventions from abroad, as to the exertions of skill and genius in producing them at home . . . .

Id. at i.

3 See note 116 infra.

4 409 U.S. 63 (1972).

5 “Software” includes “the programs, data, routines, etc., for use in a digital computer, as distinguished from the physical components.” Webster’s New World Dictionary 1353 (2d College ed. 1968).

6 Justices Stewart, Blackmun, and Powell did not participate in the decision. Mr. Justice Douglas delivered the majority and sole opinion.

7 In re Benson, 441 F.2d 682 (C.C.P.A. 1971). Under the current patent laws, an inventor whose patent application has been denied by the United States Board of Patent Appeals may appeal the decision to the United States Court of Customs and Patent Appeals (35
“process” by which a quantity expressed in one numerical system could be transformed into its equivalent in another. Benson’s reversal of the

U.S.C. § 141 (1970)) or, in the alternative, may bring a civil action against the Commissioner in the United States District Court for the District of Columbia (35 U.S.C. § 145 (1970)). Virtually all of the recent cases involving software patentability have taken the first route of appeal.

35 U.S.C. § 100(b) (1970) 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.

The process provided for the conversion of numbers expressed in binary coded decimal (BCD) to pure binary form. In both BCD and pure binary, all numbers are represented by suitable arrangements of the digits "0" and "1." Unlike the commonly used decimal system which utilizes the digits zero through nine to multiply successive powers of 10, the binary system uses only the digits zero and one to multiply successive powers of two.

Consider the following representation of the number nineteen hundred seventy-three in both the decimal (not to be confused with binary coded decimal) and binary systems.

1) Decimal representation:

\[
\begin{align*}
10^3 &= 1000 & 10^2 &= 100 & 10^1 &= 10 & 10^0 &= 1 \\
1 & 9 & 7 & 3
\end{align*}
\]

Proof:

\[
\begin{align*}
1 \times 1000 &= 1000 \\
9 \times 100 &= +900 \\
7 \times 10 &= + 70 \\
3 \times 1 &= + 3 \\
1973
\end{align*}
\]

2) Binary representation:

\[
\begin{align*}
2^{10} &= 1024 & 2^9 &= 512 & 2^8 &= 256 & 2^7 &= 128 & 2^6 &= 64 & 2^5 &= 32 & 2^4 &= 16 & 2^3 &= 8 & 2^2 &= 4 & 2^1 &= 2 & 2^0 &= 1 \\
1 & 1 & 1 & 1 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 1
\end{align*}
\]

Proof:

\[
\begin{align*}
1 \times 1024 &= 1024 \\
1 \times 512 &= +512 \\
1 \times 256 &= +256 \\
1 \times 128 &= +128 \\
0 \times 64 &= + 0 \\
1 \times 32 &= + 32 \\
1 \times 16 &= + 16 \\
0 \times 8 &= + 0 \\
1 \times 4 &= + 4 \\
0 \times 2 &= + 0 \\
1 \times 1 &= + 1 \\
1973
\end{align*}
\]

BCD is a hybrid of both the decimal and binary systems. Like decimal, the digits zero through nine multiply powers of 10 to yield the desired number. However, the individual digits of the number are expressed in binary form. Thus the decimal number 1973 is written in BCD by expressing each of the digits "1," "9," "7," and "3" as a four digit binary number.

3) BCD representation:

\[
\begin{align*}
2^3 &= 8 & 2^2 &= 4 & 2^1 &= 2 & 2^0 &= 1 \\
0 & 0 & 0 & 1 & 1 & 0 & 0 & 1
\end{align*}
\]

Proof:
CGPA (which had itself overturned a Board of Patent Appeals’ denial of the patent) also placed in question a line of precedents that had constituted the most authoritative source of law on the subject. The decision was an economic victory for computer manufacturers over software producers. Although the Court did not completely close the

\[
\begin{align*}
0 \times 8 &= 0 & 1 \times 8 &= 8 \\
0 \times 4 &= +0 & 0 \times 4 &= +0 \\
0 \times 2 &= +0 & 0 \times 2 &= +0 \\
1 \times 1 &= +1 & 1 \times 1 &= +1 \\
\hline & & 1 & 9 \\
\end{align*}
\]

\[23=8 \quad 2^2=4 \quad 2^1=2 \quad 2^0=1 \quad 23=8 \quad 2^2=4 \quad 2^1=2 \quad 2^0=1\]

Proof:

\[
\begin{align*}
0 \times 8 &= 0 & 0 \times 8 &= 0 \\
1 \times 4 &= +4 & 0 \times 4 &= +0 \\
1 \times 2 &= +2 & 1 \times 2 &= +2 \\
1 \times 1 &= +1 & 1 \times 1 &= +1 \\
\hline & & 7 & 3
\end{align*}
\]

The use of a two digit number system like binary is extremely advantageous in computer design, since the relatively simple operation of switching an electrical device on and off can be used to indicate each binary digit (commonly referred to as "bit"). Hence, "on" may represent one and "off" would then represent zero. If a sufficient number of these switching devices are strung together, any number can then be represented by switching "on" those devices corresponding to each bit position containing a one, and switching "off" those devices which stand for zero. To achieve the same result in decimal would require a string of electrical devices each capable of being switched to 10 different states instead of only two, "on" and "off."

Numbers stored in a digital computer in binary form may be added, multiplied, etc., according to the laws of binary arithmetic, by successive switching operations. The invention in the instant case addressed the problem of converting telephone numbers, dialed one digit at a time, into the binary form necessary for the achievement of a telephone interconnection. Each digit, when dialed, generated electrical impulses which caused it to be stored in binary form. Thus, after all the digits had been dialed, the overall telephone number was stored in BCD, i.e., each decimal digit was represented by its binary equivalent. A process by which this BCD representation could be converted to pure binary was needed so that it could be processed in accordance with other telephone processing routines. The purpose of the invention was to accomplish the conversion from BCD to binary, using a minimum of electrical equipment. Brief for Respondent at 5-8, Gottschalk v. Benson, 409 U.S. 63 (1972).

10 See, e.g., cases discussed at notes 33-82 and accompanying text infra.


Programming consulting firms have attempted to market their own software in competition with the hardware manufacturers. See Software Gets a Hardsell Approach, Business Week, Oct. 21, 1967, at 171. Lack of patent protection has been a major obstacle to this endeavor. Therefore, software houses have been lobbying for software patent protection legislation. Id. at 178.
door to software patentability, the programmer-inventor is likely to encounter a more confident opposition the next time he attempts to traverse a Patent Office rejection.

Unlike the typical issue of patentability which centers on disputed novelty, utility or unobviousness, the question posed in Benson was more fundamental — viz., whether the subject matter for which the patent was sought conformed to one of the five categories of invention enumerated in the Patent Act. The respondents referred to their invention as a "process," one of the classifications recognized by the current patent statute.

HISTORICAL BACKGROUND

The problem sought to be resolved in Benson originated long before terms such as "digital computer" and "software" became a part of the American vocabulary. The grandfather of the cases on process patentability dealt with a technology of far lesser complexity than that giving rise to the computer revolution. Samuel Morse's application for a patent on the telegraph provided the Court with its first significant opportunity to define the limits of patentable processes. In O'Reilly v. Morse, the inventor's failure to limit to a specific apparatus his eighth claim, by which he sought a process patent on the use of electromagnetism for transmitting intelligible characters, proved to be a fatal overbreadth. Subsequently, The Telephone Cases distinguished between Alexander Graham Bell's process claims which were confined to execution on specific electrical apparatus and Morse's which had

12 Justice Douglas stated:
It is said that the decision precludes a patent for any program servicing a computer. We do not so hold. 409 U.S. at 71.


14 In addition to the requirements of novelty and utility, section 101 also recites five categories of patentable subject matter to which a patentable invention must conform, viz., process, machine, manufacture, composition of matter, or improvement thereof. 35 U.S.C. § 101 (1970). The Benson respondent applied for a process patent.


16 The body of a patent application and resulting patent, if issued, comprise the specification. The specification includes a disclosure, wherein the inventor explains the workings of his invention, followed by one or more claims which enumerate the specific attributes of the invention to which the 17-year patent monopoly is to apply. See 35 U.S.C. § 112 (1970); 37 C.F.R. §§ 1.71, 1.75 (1972). Although the disclosure limits the scope of the claims, it is the latter which defines the rights of the patentee.


18 126 U.S. 1 (1887). These cases involved appeals from six infringement actions brought by the American Bell Telephone Company against various alleged infringers. American Bell Telephone was the assignee of two patents originally granted to Alexander Graham Bell for telegraphy and telephony, respectively. Cf. 35 U.S.C. § 152 (1970).
included no such restriction. Although this criterion for process patentability is partially valid today, subsequent cases, as will be seen, have provided alternatives to it.

The Court's concern with limiting the scope of process claims can be traced to the enabling authority for the patent system itself. "[T]o promote the Progress of Science . . .," the framers of the Constitution provided for limited monopolies to inventors in return for public disclosure of their discoveries. Congress, in exercising the discretion granted it by this constitutional provision, and the courts, in interpreting the resulting patent laws, were prudent to limit, both in duration and scope, the legal monopolies authorized. The line had to be carefully drawn. Too liberal a grant of the right to exclude all others from capitalizing on a discovery would tip the scales and retard, rather than promote, science. A denial of access to information rightfully belonging in the public domain would be totally antithetical to the objectives of the constitutional framers. What more blatant abuse of the patent power could be imagined than the grant of a legal monopoly on the exercise of an individual's thought processes?

The Mental Process Doctrine

Recognition of this potential for abuse gave rise to the "mental steps" or "mental process" doctrine. An analysis by which certain processes performed solely or substantially by the human mind are excluded from the statutory scheme of patentable subject matter was first formulated and applied by the Patent Office and later by the courts. Although the doctrine's origin can be traced as far back as the turn of the century, it has not yet ripened sufficiently to be capable of clear and certain application. On the contrary, until Benson, the

19 U.S. at 254-35.
22 In addition to the statutory classifications of patentable subject matter (35 U.S.C. § 101 (1970)), the court-created doctrine of patent misuse has also placed limits on the scope of the patent monopoly. This doctrine seeks to prevent a patentee from requiring the licensing, purchase or lease of unpatented items as a condition to acquisition of similar rights in a patented item. Patent misuse may be asserted as a defense to an infringement action or may itself be the basis of an antitrust suit. See Zenith Radio Corp. v. Hazeltine Research, Inc., 395 U.S. 100, 136 (1969); Stearns v. Tinker & Rasor, 252 F.2d 589, 600-05 (9th Cir. 1957); Laitram Corp. v. King Crab, Inc., 245 F. Supp. 1019 (D. Alas. 1965).
24 [T]he question of whether a step in a process is mental or physical seems to us to be one of fact rather than one of law and so should not be difficult of determination, but opinions sometimes differ even as to facts.
doctrine had undergone considerable erosion in the Court of Customs and Patent Appeals.

Among the first of the mental process applications to come before the Commissioner of Patents was Ex parte Meinhardt. The inventor had devised a system for determining the width and spacing of lettering to be altered in height so as to maintain the previous proportions of the writing. The Commissioner denied the application, finding that the invention was neither a process nor an art. On rehearing, the Commissioner said:

> It is conceivable that some persons after long and arduous study might discover a new method for solving certain mathematical problems which was much simpler and shorter than any known method; but such method would not be a proper subject for a patent. So, in the present case, applicant's plan, no matter what its merit, does not come within the classes for which protection can be secured under the patent laws.

Had the Benson claim which dealt with execution of the conversion process on a re-entrant shift register been brought before the same Commissioner, it is not improbable that the same response would have been elicited. However, the Benson disclosure taught a process for solving a mathematical problem — viz., converting binary coded decimal (BCD) numbers to binary, in a simplified way, i.e., with less computer hardware than would otherwise be required. Unlike the Meinhardt claims,

In re Abrams, 188 F.2d 165, 168 (C.C.P.A. 1951).

The appellant in Abrams suggested the following cookbook recipe for applying the mental steps doctrine:

1. If all the steps of a method claim are purely mental in character, the subject matter thereof is not patentable within the meaning of the patent statutes.
2. If a method claim embodies both positive and physical steps as well as so-called mental steps, yet the alleged novelty or advance over the art resides in one or more of the so-called mental steps then the claim is considered unpatentable for the same reason that it would be if all the steps were purely mental in character.
3. If a method claim embodies both positive and physical steps as well as so-called mental steps, yet the novelty or advance over the art resides in one or more of the positive and physical steps and the so-called mental step or steps are incidental parts of the process which are essential to define, qualify or limit its scope, then the claim is patentable and not subject to the objection contained in 1 and 2 above.

The Abrams court expressly declined either to adopt or reject this formula, but noted that it was consistent with prior case law. Furthermore, the Court noted that, even if it were to apply the suggested test, petitioner would fail since he fell under rule 2 rather than rule 3. Id. at 167-73. Subsequently, the Board of Patent Appeals relied on and applied these rules in a number of cases. See In re Musgrave, 431 F.2d 882, 886 (C.C.P.A. 1970), where the CCPA again disavowed adoption of these rules.

26 1907 Dec. Com. Pat. at 238.
27 Id. at 239.
28 See note 104 and accompanying text infra.
Benson's were associated with the operation of a particular apparatus, a digital computer. As will be shown, the significance of this distinction proved to be the source of great conflict between the Patent Office and the CCPA prior to Benson.

The development of the mental process doctrine subsequent to Meinhardt was not confined to processes for the solution of mathematical problems. It was later associated with the rejection of patents for: a method of testing electrical insulators where mental comparisons of the results were essential to their evaluation; a process whereby light could be modulated by music to produce an aesthetically pleasing effect; and a method of preventing seasickness by a prescribed manner of mental concentration.

The doctrine still retained its vitality in 1951 when In re Abrams was decided by the Court of Customs and Patent Appeals. Here, a method for prospecting petroleum was the subject of a rejected patent application. The process consisted of drilling holes in the ground to be prospected, evacuating the air from within, and then measuring the rate of pressure increase in the holes caused by gas emissions from underground petroleum deposits. After this physical phase, mental computations were to be performed on the measured data to determine whether there was sufficient petroleum to render extraction feasible. Finding that the novelty of the invention resided in the mental rather than the physical phase of the process, the court affirmed the opinion of the Board of Appeals of the United States Patent Office in disallowing the claims in issue.

In re Shao Wen Yuan, decided by the same court thereafter,

29 Gree nell v. Stanley Co. of America, 54 F.2d 195 (1931).
32 Among the pre-1951 cases which reinforced the mental process doctrine were, in chronological order: Don Lee, Inc. v. Walker, 61 F.2d 58 (9th Cir. 1932) (patent for improvement, based on computation, in method of counterbalancing engine main shafts invalid as non-statutory subject matter and as anticipated by prior art); In re Bolongoro, 62 F.2d 1059 (C.C.P.A. 1933) (mathematical method used for printing publications from manuscripts not patentable subject matter); In re Cooper, 134 F.2d 630 (C.C.P.A. 1943) (formula for determining carbon content of steel not statutory subject matter); Halliburton Oil Well Cementing Co. v. Walker, 146 F.2d 817 (9th Cir. 1944), rev'd on other grounds, 329 U.S. 1 (1946) (mathematical method of finding an obstruction in a well used mental steps and was unpatentable); In re Heritage, 150 F.2d 554 (C.C.P.A. 1945) (mental process for choosing proper quantity of fiber board coating material not patentable).
33 188 F.2d 165 (C.C.P.A. 1951).
34 Id. at 170.
35 Id.
36 188 F.2d 377 (C.C.P.A. 1951).
involved an attempt to patent a means of determining the dimensions of an air foil. The inventor had developed a mathematical formula which would yield the dimensions from parameters indicative of the desired aerodynamic characteristics. Unlike the holdings in Morse and The Telephone Cases which turned on the presence or absence of a physical process-implementing apparatus, the Shao Wen Yuan court held that a patentable process must be performed on physical matter so as to alter its state. Finding this alternative prerequisite unsatisfied here in the case at bar, the court sustained the Patent Office rejection under the mental process doctrine.

Erosion of the Doctrine

Neither of the applications at issue in Abrams and Shao Wen Yuan disclosed a mechanical apparatus by which their claimed processes could be executed absent human intervention. Thus, when, in 1969, the CCPA decided In re Prater, it found the previous two cases to be non-controlling. The Prater application was for a patent on a quantitative spectrographic analysis process. A method of processing the resultant data by computer, without human intervention, was disclosed. Notwithstanding this departure from the facts present in Abrams and Shao Wen Yuan, the Prater court affirmed the Patent Office's rejection of the process claims since the process as performed on the mechanical apparatus had not been claimed. Absent express provisions in the relevant process claims limiting their application to specified mechanical means of analyzing the data, description in the patent disclosure of such means would not remove the claims from the mental process prohibition.

37 Webster's Third New International Dictionary (1966) defines an "air foil" as a body (as an airplane wing or propeller blade) designed to provide a desired reaction force when in motion relative to the surrounding air.
38 188 F.2d at 378.
39 See notes 15-19 and accompanying text supra.
40 188 F.2d at 381.
41 Id. at 383.
43 415 F.2d at 1401-03.
44 Id. at 1395.
45 Id. at 1403. The court noted that the disclosure was of a patentable process. Id.
46 Id. at 1403-05.
Although disclosure of all subject matter claimed is a prerequisite to a patent, the disclosure will not be read into a claim, not otherwise sufficiently limited, so as to save it from rejection as a mental process.\(^{47}\)

Thus, although the CCPA intimated in *Prater* that a process limited to execution on a computer might be patentable under section 101,\(^ {48}\) it expressly declined to decide the issue, relying instead on the insufficiency of the claim, as drafted, under section 112.\(^ {49}\) Nevertheless, the court had provided what appeared to be the key to patenting a computer process.

The deficiency in the *Prater* claims was avoided in *In re Bernhart*,\(^ {50}\) resulting in allowance of an otherwise similar process claim. *Bernhart* involved a process by which a three-dimensional object could be portrayed in two dimensions from any desired viewing angle.\(^ {51}\) The process consisted of programming a digital computer to operate on the coordinates of a three-dimensional object in accordance with a prescribed mathematical formula. The results, then in the form of electrical impulses, were relayed to a mechanical plotter which drew the desired two-dimensional representation. Although the process could theoretically be performed by an unaided human being,\(^ {52}\) express provision in the claims for use of a digital computer and plotting apparatus avoided rejection as a mental process.\(^ {53}\) Furthermore, the *Bernhart* court decided the issue it had previously sidestepped in

47 Id. at 1403-04.

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.

Cf. note 14 supra.

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention. . . .

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.
51 Id. at 1396.
52 As a practical matter, manual computations would be quite burdensome when applied to complex three-dimensional forms. Therefore, the ability to achieve the two-dimensional representation without human intervention was a significant development.
53 417 F.2d at 1401.

Three claims in the application which did not pass muster were rejected for lack of novelty and not for failure to conform to the criteria for statutory subject matter.
Prater, viz., whether a mathematical process performed on a mechanical device would qualify as patentable subject matter under section 101 of the statute. The question was answered in the affirmative.\textsuperscript{54}

Having opened the doors to computer process patents, the CCPA proceeded to liberally refine the criteria it had promulgated. \textit{In re Mahony}\textsuperscript{55} obviated the need for express reference to a mechanical device in a process claim where the process was inherently limited to execution on such apparatus (notwithstanding that it could be simulated by a mental process). The application claimed a process for selecting whole "words" of information from a continuous stream of electrical impulses, \textit{i.e.}, a method of identifying the beginning and end of each word.\textsuperscript{60} The bits of information constituting the letters of a word were characteristically represented in writing by zeros and ones and the method described could be simulated by a human using pencil and paper. The court found that the Patent Office had confused the process, which was inherently restricted to electrical impulses and could not be humanly performed, with a symbolic simulation of the process achievable by mental steps.\textsuperscript{67} Since the applicant had attempted to patent the former and not the latter, the subject matter could not be excluded under the mental process doctrine.\textsuperscript{58}

\textit{In re Musgrave}\textsuperscript{59} approved a claim for processing seismic data expressed as signals notwithstanding the fact that the same information could be processed by mental steps.\textsuperscript{60} This case dealt a serious blow to the already eroded mental process doctrine.\textsuperscript{61}

Possibly seeking to soften the effect of its holding in \textit{Musgrave}, the CCPA qualified the earlier decision when dealing with a similar process in \textit{In re Foster}.\textsuperscript{62} The court noted that the broad definition of the term "signals" encompasses "visible patterns which may be sub-

\textsuperscript{54} Id.
\textsuperscript{55} 421 F.2d 742 (C.C.P.A. 1970).
\textsuperscript{56} Consider an alphabet of only two letters and no provision for spaces. A sentence of words written with this alphabet would appear as a continuous stream of letters. In order to receive the information contained in the sentence, one would have to be able to group the letters into the words they represent. This is the situation encountered in a simple electronic data processor wherein devices are switched "on" to represent one bit of the two-bit alphabet and "off" to represent the other.

The invention claimed by Mahony provided a method for using the bits to perform the function of spaces between the words as well as letters of the words. The invention included a synchronizing circuit for differentiating between letter bits and space bits. \textit{See} 421 F.2d at 743.
\textsuperscript{57} 421 F.2d at 746.
\textsuperscript{58} Id. at 747.
\textsuperscript{59} 431 F.2d 882 (C.C.P.A. 1970).
\textsuperscript{60} Id. at 893.
\textsuperscript{61} Id. at 895 (Baldwin, J., concurring).
\textsuperscript{62} 438 F.2d 1011 (C.C.P.A. 1971).
jected to manual manipulation." It therefore disallowed claims couched in terms of "signals" while allowing those that referred to "electrical signals," the latter being incapable of manual manipulation.

In re Benson and the CCPA

It was against the background of this liberal trend that the CCPA entertained an appeal from the Patent Board of Appeals' rejection of Benson's claims 865 and 1366 for a process whereby numbers expressed in BCD form could be converted to pure binary.67 Judge Rich, writing

63 Id. at 1061.
64 Id.
65 Claim 8, the first of the two claims considered, read as follows:
   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 re-entrant shift register,
   (2) shifting the signals to the right by at least three places, until there is a binary '1' in the second position of said register,
   (3) masking out said binary '1' in said second position of said register,
   (4) adding a binary '1' to the first position of said register,
   (5) shifting the signals to the left by two positions,
   (6) adding a '1' to said first position, and
   (7) shifting the signals to the right by at least three positions in preparation for a succeeding binary '1' in the second position of said register.
409 U.S. at 73-74.

66 Claim 13 read:
   A data processing method for converting binary coded decimal number representations into binary number representations comprising the steps of—
   (1) testing each binary digit position '1,' beginning with the least significant binary digit position, of the most significant decimal digit representation for a binary '0' or a binary '1';
   (2) if a binary '0' is detected, repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;
   (3) if a binary '1' is detected, adding a binary '1' at the (i + 1)th and (i + 3)th least significant binary digit positions of the next lesser significant decimal digit representation, and repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;
   (4) upon exhausting the binary digit positions of said most significant decimal digit representation, repeating steps (1) through (3) for the next lesser significant decimal digit representation as modified by the previous execution of steps (1) through (3); and
   (5) repeating steps (1) through (4) until the second least significant decimal digit representation has been so processed.
409 U.S. at 74.

67 As an illustration of the methods claimed, consider the conversion of the ordinary decimal number 53 from BCD to binary. Note that 53 in BCD is 5 in binary, written to the left of 3 in binary:

\[
\begin{array}{cccccc}
2^3 & 2^2 & 2^1 & 2^0 & \text{BCD} & \text{Binary} \\
0 & 1 & 0 & 1 & 5 & 1
\end{array}
\]

Taking claim 8 first (see note 65 supra):

1) the BCD representation above is stored in a re-entrant shift register. A re-entrant shift register is a device which stores individual bit signals (represented by "0" and "1" above) and allows all bits to be simultaneously shifted to the right or left so that as bits are pushed out of one side of the register they re-enter the other side in the same order. See Brief for Respondent at 7 n.8, Gottschalk v. Benson, 409 U.S. 63 (1972). For our exam-
Pie, consider an eight position shift register, i.e., one capable of storing eight bits, the amount needed to represent any two-digit decimal number. The BCD representation of 53 appears in the re-entrant shift register as:

```
 0 1 0 1 0 0 1 1
```

2) shifting the digits to the right at least three places until there is a binary '1' in the second position yields the following configuration:

First shift: 1 0 1 0 1 0 0 1
Second shift: 1 1 0 1 0 1 0 0
Third shift: 0 1 1 0 1 0 1 0

Since three shifts have been made and there is now a binary '1' in the second position (from the right) no further shifts are necessary at this time. Were there a '0' in that position shifting would continue until a '1' occupied it.

3) masking out the binary '1' in the second position is equivalent to changing it to a '0'. This leaves:

```
0 1 1 0 1 0 0 0
```

4) adding a binary '1' to the first position gives:

```
0 1 1 0 1 0 0 1
```

5) shifting the signals to the left by two positions:

First shift: 1 1 0 1 0 0 1 0
Second shift: 1 0 1 0 0 1 0 1

6) adding a '1' to the first position:

```
1 0 1 0 0 1 1 0
```

Note: in binary arithmetic 1 + 1 = 1 0

7) shifting to the right by at least three places as in step 2 until there is a '1' in the second position:

First shift: 0 1 0 1 0 0 1 1
Second shift: 1 0 1 0 1 0 0 1
Third shift: 1 1 0 1 0 1 0 0
Fourth shift: 0 1 1 0 1 0 1 0

There is now a '1' in the second position. Now complete the second cycle from step 3 onward.

3') mask out the second position.

```
0 1 1 0 1 0 0 0
```

4') add a binary '1' to the first position.

```
0 1 1 0 1 0 0 1
```

5') shift to the left by two positions.

First shift: 1 1 0 1 0 0 1 0
Second shift: 1 0 1 0 0 1 0 1

6') add a '1' to the first position.
for a unanimous panel in *In re Benson* reversed the Board of Appeals and held that the claims concerned patentable subject matter. The *Benson* claims were said to have fallen prey to the same “blanket Patent Office policy” that had instigated similar rejections in *Prater, Bern- *

\[
\begin{array}{c}
1 \ 0 \ 1 \ 0 \ 0 \ 1 \ 1 \ 0
\end{array}
\]

Since the net number of shifts since step 1 was three to the right (steps 2, 5, 7 and 5) shift three to the left or five to the right to reach the final result.

First shift: 0 1 0 1 0 0 1 1
Second shift: 1 0 1 0 1 0 0 1
Third shift: 1 1 0 1 0 1 0 0
Fourth shift: 1 1 0 1 0 1 0 0
Fifth shift: 0 0 1 1 0 1 0 1

The bit representation appearing in the register after the fifth shift to the right is 53 in binary notation; 25 + 24 + 22 + 20.

Claim 13 claims the same basic technique but accomplishes the conversion without shifting the digits in a shift register. No specific apparatus is named in claim 13. Following the steps in claim 13, start with the BCD representation of 53:

\[
\begin{array}{c|c}
(5) & (3) \\
0 & 1 & 0 & 1 & 1 & 0 & 0 & 1 & 1
\end{array}
\]

1) Test each bit of the most significant digit (5) for a '0' or a '1'.

\[
\begin{array}{c|c}
\times & \times \\
0 & 1 & 0 & 1 & 1 & 0 & 0 & 1 & 1
\end{array}
\]

2) A '1' is found in the first and third bits of the most significant digit (5 = 0101). Therefore i = 1 and 3.

3) Add a binary '1' at the (i + 1)th and (i + 3)th, i.e., second and fourth positions for i = 1, and fourth and sixth positions for i = 3, of the next lesser significant digit (3 = 0011):

\[
\begin{array}{c|c|c|c|c|c|c|c}
0 & 0 & 1 & 1 \\
1 & 0 & 1 & 0 \\
1 & 0 & 1 & 0 & 0 & 0 \\
1 & 1 & 0 & 1 & 0 & 1
\end{array}
\]

4) Since the second least significant digit (5) has been processed, the result of step 3 is the end result. See Brief for Appellant at 8a — 13a, Gottschalk v. Benson, 409 U.S. 63 (1972).

\[441 \text{ F.2d} 682 (C.C.P.A. 1971). \] In addition to Judge Rich, the court included Judges Almond, Baldwin and Lane of the CCPA and Judge Re of the United States Customs Court, who sat by designation. *Id.*

\[50 \text{ Id. at 688.} \] Patent Office policy regarding software applications has been subject to modification. On August 16, 1966, Commissioner Brenner published *Guidelines to Examination of Programs*. Citing *Abrams* and *Shao Wen Yuan*, the Commissioner declared that mathematical formulas were not section 101 subject matter. However, a distinction was made between “algorithm and utility processes,” the former lying outside the scope of section 101 but the latter included in it. 829 OFFICIAL GAZETTE 865, 865-66 (1966) [hereinafter cited as 1966 Guidelines].

On October 22, 1968, two years after a hearing on the 1966 guidelines, the same Commissioner published *Guidelines to Examination of Applications for Patents on Computer Programs*. Again citing *Abrams* and *Shao Wen Yuan*, this new and abbreviated guideline deleted the former algorithm versus utility distinction. The only exception provided for was an information-producing routine which was combined with the physical
hart, Mahony, Musgrave and Foster. However, the court distinguished In re Benson as presenting an additional problem. In the earlier cases, the data processing art to be patented was claimed in support of a specific and supplementary technical art. Benson’s claims for a data processing art stood entirely alone.\(^{71}\) Notwithstanding this difference, the court found sufficient precedent in Mahony and Musgrave to uphold the first of the claims in issue.\(^{72}\) Claim eight provided for performance of the conversion process via a re-entrant shift register, i.e., the claim was confined to performance on a specific piece of hardware.\(^{73}\) Furthermore, the court found that the claim’s reference to “signals,” in the context presented, was inherently limited to electrical signals processed by the hardware described, thereby eliminating any need to expressly designate the signals as “electrical.”\(^{74}\) Although claim 13 was framed in more abstract terminology and made reference to no mechanical implementing device, it was nevertheless upheld under a pragmatic analysis. By determining that the claimed process had “no practical use other than the more effective operation and utilization of a machine known as a digital computer,”\(^{75}\) the court was able to reason that the subject matter claimed must be a useful art\(^{76}\) and therefore within the ambit of the patent statute.\(^{77}\)

The CCPA, Post In Re Benson

Three weeks after this decision which was to finally bring the software patentability issue before the Supreme Court, the CCPA, in In re Mcllroy,\(^{78}\) affirmed its Benson stance and reversed a Board of Appeals’ rejection of claims for a method of retrieving symbolic data in a digital computer. Relying on the useful arts doctrine promulgated in

steps of a process that appreciably changed the character or condition of physical materials. 855 Official Gazette 829, 829-30 (1968) [hereinafter cited as 1968 Guidelines].

\(^{71}\) 441 F.2d at 685.
\(^{72}\) Id. at 687.
\(^{73}\) Id.
\(^{74}\) Id.
\(^{75}\) Id. at 688.
\(^{76}\) Originally appearing in the constitutional authorization for patent grants, the useful arts criterion had come full circle. The first United States patent act provided for patents on inventions or discoveries of any “useful art, manufacture, engine, machine, or device, or any improvement therein, . . .” Act of April 10, 1790, ch. 7, § 1, 1 Stat. 109, 110. The term “useful art” was retained throughout the numerous revisions of the statute until enactment of the 1952 version wherein the term “process” was substituted for “art” among the categories of patentable subject matter. See 35 U.S.C. § 101 (1970) (Reviser’s Note). In Musgrave, however, Judge Rich preferred to speak in terms of a “useful arts” test which was also deemed synonymous with “technological arts” in determining statutory subject matter. The same test was applied in In re Benson. See note 82 infra.
\(^{77}\) 441 F.2d at 688.
\(^{78}\) 442 F.2d 1397 (C.C.P.A. 1971).
SOFTWARE PATENTABILITY

Benson, the CCPA found the subject matter of the claims patentable under section 101. The court also reiterated the position it had taken in Musgrave that "machine implementation versus mental implementation is not a determinative dichotomy in deciding whether a method is statutory under 35 U.S.C. § 101." Pending the Benson appeal, the mental steps doctrine as applied to computer processes was dealt a final blow before its revival by the Supreme Court. In re Waldbaum was the last of a line of CCPA cases to uphold software claims as within the useful arts prior to the Supreme Court's landmark Benson decision. In Waldbaum, a method of counting the number of "ones" in a data word was held to be patentable subject matter. Like McIlroy, this decision was supported by In re Benson and Musgrave and turned on application of the useful arts test.

GOTTSCALK v. BENSON

On October 16, 1972, the Supreme Court convened to review the CCPA's overturn of Patent Office rejections on claims 8 and 13 of the Benson application.

The respondent argued that the claims in question related only to the machine process disclosed and were not intended to cover any other application of the mathematical relationship, the latter being merely incidental to the invention. Thus, the argument posed in favor of the patent attacked the applicability rather than the validity of the mental process doctrine.

79 Id. at 1398.
80 Id.
82 Id. at 1003. Concurring in Waldbaum, Judge Rich took credit for originating the "technological arts" or "useful arts" test. He was careful to note, however, that "[n]o new legal concept was intended." Id.
85 The legal controversy surrounding the issue of software patentability was not, by any means, the only problem facing the respondent in Benson. Numerous practical problems were also present, including concern over the ability of the patent office to implement classification and search procedures for software patents, a lack of technical expertise on the part of judges who would be called on to adjudicate controversies concerning software patents, and the effect of software patentability on the industries involved in the development and utilization of computer software. Fear was expressed that the enormous amount of software constantly being generated would result in an unmanageable volume of prior art, thereby making determinations of novelty and obviousness, prior to litigation, virtually impossible. See 409 U.S. at 72-73; REPORT OF THE PRESIDENT'S COMM'N ON THE PATENT SYSTEM, "TO PROMOTE THE PROGRESS OF . . . USEFUL ARTS," reprinted in S. Doc. No. 5, 90th Cong., 1st Sess. 13 (1967) [hereinafter cited as PRESIDENT'S COMM'N]. However, the basis of these reservations has never been conclusively established. On the contrary, the Patent Office, despite the problems it faces
Paradoxically, the very premise relied on by the CCPA in up-
regarding search and classification of computer programs, has established a subclass for computer software. See Bigelow, Legal Aspects of Proprietary Software, DATAmATION, Oct., 1968, at 32, 33.

The Patent Office appears to be having its share of difficulties without the additional burden of software patent applications. See Benett & Hess, The Crisis in Patents, MANAGEMENT REVIEW, May, 1967, at 64 [hereinafter cited as Crisis]. As of 1967, the average minimum time to secure a patent was estimated to be "at least two to three years." Id. at 64. The backlog problems of the United States Patent Office are not unique. Despite its shortcomings, no other nation can claim a more efficient system. Nor has the problem been neglected: The Patent Office has streamlined its procedures, personnel have been added, and modern information storage and retrieval techniques utilizing computers and microfilm have been adopted. Id. at 66. Yet the problem is overwhelming. In addition to the numerous patent applications originating domestically, many foreign inventors seek the protection of the United States patent laws. Id. at 64-65. Foreign patents may also be cited as prior art against U.S. inventors, thereby barring patents to the latter for lack of novelty. 35 U.S.C. § 102 (1970).

The "Paris Convention," established in 1883, has discussed the feasibility of an international patent system to facilitate searches and eliminate the need for multiple filing in order to serve multi-national patent protection. It has been predicted that:

A hovering over the world of tomorrow will be high capacity satellites synchronized with large patent data processing and information storage systems. Through a desk instrument the inventor and his patent attorney will be able to submit their application to the international patent office. Within a matter of days—not years—the inventor might be informed that his patent has been filed and issued in Washington as well as in any other office adhering to the world system.

Crisis at 68.

This optimism, however, does not seem to offer much consolation for the present. And, absent these projected developments, the additional task of classifying and searching software inventions, engendered by their inclusion in the realm of statutory subject matter, appears to be more than the Patent Office would like to assume or the Court is willing to thrust upon it. For a more down-to-earth analysis of the issues attending classification and search of software patents, see Spencer, Retrieval of Programming Technology for Patent Purposes, 52 J. PAT. OFF. Soc'y 125 (1970). In any event, the mere possibility of causing some inconvenience to the Patent Office is hardly sufficient justification for the denial of a right authorized by the Constitution and mandated by Congress.

Although not expressly mentioned in Benson, there have been previous acknowledgments of the courts' limitations when called upon to adjudicate the highly technical issues which attend patent litigation.

It is an old observation that the training of Anglo-American judges ill fits them to discharge the duties cast upon them by patent legislation.

Marconi Wireless Telegraph Co. of America v. United States, 320 U.S. 1, 60-61 (1943) (Frankfurter, J., dissenting).

I cannot stop without calling attention to the extraordinary condition of the law which makes it possible for a man without any knowledge of even the rudiments of chemistry to pass upon such questions as these.

Parke-Davis & Co. v. H.K. Mulford Co., 189 F. 95, 115 (C.C.S.D.N.Y. 1911), modified, 196 F. 496 (2d Cir. 1912).

While this problem applies to patent cases in general, the confusion is compounded when the uncertainties of the mental process doctrine are invoked in the formulation of a decision.

Although the amicus briefs of 16 interested groups were filed in Benson, the Court did not expressly address itself to the consequences of software patents on the computer industry. Nevertheless, the economic interests of the software developers in maintaining exclusive control of their product versus the hardware manufacturers' desire to assure an adequate supply of low cost processing routines for their machines presents a real issue. See note 11 supra.
holding claim 13 led the Supreme Court to the opposite conclusion with respect to both claims.

The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly preempt the mathematical formula and in practical effect would be a patent on the algorithm itself. At first glance, this reasoning appears diametrically opposed to that which barred Samuel Morse's claims on the telegraph. Morse's claims regarding the transmission of symbolic characters, unrestricted to any specific apparatus, were invalidated as threatening to preempt the entire field. However, the court's finding that the sole practical application of the Benson discovery was in conjunction with a digital computer was not an acknowledgment that the process was limited to performance on a specific apparatus but was instead an assertion that its use on a digital computer constituted the whole field.

 precedents in the court

Having never before faced the issue of software patentability, the Court looked to its early process patent cases. Despite the historical emphasis on presence or absence of physical apparatus for implementing a patentable process, a closer examination of these cases shows this criterion to be merely one means of achieving a broader end, adequate limitations on the scope of the monopoly sought.

The Benson Court qualified dicta from the 1853 case of Corning v. Burden which had purported to eliminate the requirement that a patentable process be confined to use in conjunction with a specific machine. The examples cited in that case were deemed dependent on definite chemical and physical processes and acts sufficiently limiting to allay fears of unbounded monopoly. Thus, where an adequate substitute test served to limit the monopoly granted, the physical apparatus requirement became dispensable.

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86 See note 75 and accompanying text supra.
87 409 U.S. at 71-72.
88 See note 17 and accompanying text supra.
89 56 U.S. (15 How.) 252 (1853).
90 In Corning, the Court noted that useful improvements in certain processes may be patented. Among the examples given were "[t]he arts of tanning, dyeing, making waterproof cloth, vulcanizing India rubber [and] smelting ores." Id. at 267-68. The Benson Court accounted for the classification of these processes as statutory subject matter by noting that the physical and chemical phenomena by which raw materials were to be transformed in these processes were sufficiently well defined so as to keep the scope of the patents within manageable bounds. 409 U.S. at 69.
In attempting to reconcile this reasoning with Cochran v. Deener,¹ which required neither a specific executing apparatus nor a limiting physical or chemical phenomenon, Benson reverted to the physical product rationale. Cochran involved a patent on a process for purifying flour. It consisted of three basic steps. First, the finest grains of flour which were pure in themselves were removed. Second, the remaining mixture of coarse flour grains and impurities was separated by blasts of air. Lastly, the separated course grains were finely ground and recombined with the original fine grains.² The process was not limited to any specific apparatus nor was it limited in scope by any confining chemical or physical phenomena. Nevertheless, the Cochran Court affirmed the patentability of the process notwithstanding its noncompliance with the formerly required criteria and noted that use of the process by someone other than the patentee or his licensee, regardless of the apparatus employed, would infringe the process patent.³

The Benson Court reasoned that Cochran was not an anomaly but was grounded on a sound alternative basis for patentability which did not support the claims in the instant case:

Transformation and reduction of an article "to a different state or thing" is the clue to the patentability of a process claim that does not include particular machines.⁴

Since neither of the processes claimed in Benson resulted in a substantive article or thing, the physical product rationale was inapplicable.

An Alternative to Software Process Patents

The Court expressly limited its holding to execution of the so-called process on a general purpose digital computer,⁵ i.e., one which can be universally programmed to perform various operations without altering its inherent physical construction. The question then arises, had a "hard-wired" machine been devised to convert BCD to binary numbers on the basis of the discovered algorithm, said machine being incapable of performing any other function, would a patent on it have survived the scrutiny of the Court?

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¹ 409 U.S. 780 (1876).
² Id. at 785.
³ Id. at 788.
⁴ 409 U.S. at 71.
⁵ 409 U.S. at 70. The Court cited several of its earlier decisions respecting patents involving processes whereby articles were changed to different states: Waxham v. Smith, 294 U.S. 20 (1935), and Smith v. Snow, 294 U.S. 1 (1935) (involving a process for artificially hatching eggs); Expanded Metal Co. v. Bradford, 214 U.S. 366 (1909) (process for expanding sheet metal solely by physical, as opposed to chemical, means was patentable); Tilghman v. Proctor, 102 U.S. 707 (1880) (conversion of fatty bodies to glycerine and fat acids was a patentable process).
The Patent Office has issued approximately 75 apparatus patents for means of transforming numbers between BCD and binary. Patents have long been granted for machines capable of performing mathematical operations, notwithstanding that the latter may be simulated mentally with or without pencil and paper.

Unlike process patents, those for machines have not been vulnerable to the mental process doctrine. Aware of this, patent attorneys more concerned with securing patents for the protection of their clients than with challenging court-made dogma have been successful in substantially circumventing the problems attending mental processes. By drafting claims to center on apparatus rather than processes, they have secured the patenting of inventions founded on mathematical relationships. Although these patents do not prevent use of the disclosed relationships via mental steps or with the aid of pencil and paper, sufficiently broad descriptions of the apparatus claimed substantially preclude their exploitation via almost any known mechanical means. This is particularly significant since the complexity of many of these relationships makes their mental use, although possible when aided by pencil and paper, economically and practically unfeasible. Furthermore, the protection offered by the apparatus patent is often broader and therefore superior to that of a corresponding process patent. With regard to the latter, the sequence of process steps enumerated in the claims often narrows the scope of the patent. Thus, a change in the sequence of steps or elimination of one or more steps may result in a non-infringing use of the invention.

See, e.g., patent no. 3,500,883, issued to John W. Pross Jr., for Binary to Binary Coded Decimal Conversion Apparatus; patent no. 3,505,675, issued to Thomas O. Holtey, for Converter for Binary and Binary-Coded Decimal Numbers; patent no. 3,535,498, issued to Louis G. Smith, Jr., for Matrix of Binary Add-Subtract Arithmetic Units with Bypass Control.

See, e.g., patent no. 627,791, issued to Gustav Zeidler in 1899, for Calculating Machine; patent no. 140,146, issued to Gustavus Linderoos in 1873, for Adding Machines; patent no. 137,107, issued to Archibald M. Stephenson in 1873, for Adding Machines.

See, e.g., patent no. 3,601,593, issued to Frank Preston, for Inverse Tangent Generator. This patent discloses a mathematical formula for computing the inverse tangent to any required degree of accuracy. An electronic circuit capable of performing the computation is described. However, the invention is not limited to this circuit. On the contrary, the circuit is specified as only one of several alternative means by which the computation may be performed. This disclosure notes that the equations presented may be "mechanized by a digital computer."

The first and broadest claim denotes a "function generator" composed of means for computing various quantities used in the computation. No specific electrical or mechanical device is specified and generation of the inverse tangent by a digital computer is arguably within the scope of this claim. It is not until the fourth claim that the invention is narrowed to specific electronic apparatus.

Although claims such as these have never been tested by Supreme Court scrutiny, they have survived the Patent Office, thereby affording a presumption of their validity.
The apparatus patent, notwithstanding its own limitations, is not subject to these particular weaknesses. This distinction is especially relevant to mathematical computations wherein certain steps may be executed in more than one sequence to reach the same final result. No matter what the sequence of steps, any use of the process on a device within the scope of the apparatus' claims infringes the patent.

Synergism and Obviousness v. The Mental Process Doctrine

In view of the Benson holding, if there is to be any possibility of securing Supreme Court approval of a process claim for software, the process must be distinguished from those previously deemed performable by mere mental steps. The Supreme Court has historically denied patents to mental processes the subject matter of which was essentially mere abstract thoughts, ideas, principles, or scientific truths. Furthermore, the mere application of a patented machine to a new use does not per se constitute invention of a process under the patent laws. However, if the process and machine synergize to effect a whole greater than the sum of its constituent parts, an argument favoring patentability arises.

The synergism argument is conventionally applied to find inven-

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99 In his first policy statement, Commissioner Brenner distinguished between patentable utility processes and non-patentable algorithm processes. See 1966 Guidelines, supra note 70. In order to differentiate the two, the concepts of the result of a method and the function of its steps were defined. The result relates to the mathematical transformation of data, whereas the function concerns "the change in state of certain electrical or mechanical devices within the computer according to the algorithm. . . ." 441 F.2d at 865-66. Under the guideline, a computer program expressed in terms of the functioning of the machine's components, as opposed to an algorithm, would be classified as a utility process and would, therefore, be patentable. See 1966 Guidelines, supra note 70.


101 [A] machine of which we were possessed might be applied by every man to any use of which it is susceptible, and . . . this right ought not to be taken from him and given to a monopolist, because the first perhaps had occasion so to apply it. Thus a screw for crushing plaster might be employed for crushing corn-cobs. And a chain-pump for raising water might be used for raising wheat: this being merely a change of application.

WRITINGS OF THOMAS JEFFERSON, 182-84 (Washington ed.).

The mere function of a patented machine may not be patented as a process. However, a new process may be patented, notwithstanding that it is performed on a machine. Chisholm-Ryder Co., Inc. v. Buck, 65 F.2d 735, 736 (4th Cir. 1933). For an extensive discussion of the "function of a machine" doctrine, distinguishing the patentable function of a machine from the non-patentable effect of the machine, see In re Tarczy-Hornoch, 397 F.2d 856 (C.C.P.A. 1968).

tion in a machine composed of a combination of "old" parts and was, therefore, not before the Benson Court. It is suggested, however, that had it been presented, it might have provided an analogy sufficient to distinguish the Benson invention from other non-patentable mathematical processes capable of execution by a digital computer. Prior to the Benson discovery, both machines and mathematical formulae were available to accomplish the process of BCD to binary conversion.\footnote{103 The conventional conversion method illustrated supra note 9 is performable on virtually any general purpose digital computer with multi-digit addition and storage capabilities. In addition, other conversion means have been patented. See note 96 supra.} However, general purpose electronic data processing machines could not perform the process if they lacked either an "adder" capable of adding multi-digit binary numbers or sufficient circuitry to "store" conversion factors.\footnote{104 Brief for Respondent at 6, Gottschalk v. Benson, 409 U.S. 63 (1972).} The Benson discovery combined a known machine, previously incapable of BCD to binary conversion, with a mathematical relationship heretofore requiring, for its machine utilization, the addition and storage of multi-digit binary numbers to yield an improved and simplified conversion process.\footnote{105 Id. at 6-7.}

It is well settled that a patent may issue to a new process notwithstanding that it is executed on an old machine.\footnote{106 See Carnegie Steel Co. v. Cambria Iron Co., 185 U.S. 403, 424-25 (1902); New Process Fermentation Co. v. Maus, 122 U.S. 413, 428 (1887); Cowles Co. v. Frost-White Paper Mills, 174 F.2d 868, 870 (2d Cir. 1949).} While the synergism test has, in the past, been principally applied to demonstrate presence or absence of obviousness,\footnote{107 See Anderson's-Black Rock, Inc. v. Pavement Salvage Co., Inc., 396 U.S. 57 (1969).} it, like the mental process test, is a creature of the courts and the reasoning which supports it could be persuasive as against the enigmas of the mental process doctrine.

Another test that, in the opinion of the writer of this Note, would have proven more satisfactory than the mental process analysis actually applied in Benson is section 103's obviousness standard. Obviousness was not an issue before the Supreme Court since the sole ground for rejection of the Benson application was lack of statutory subject matter under section 101.\footnote{108 441 F.2d at 684.} Had the Patent Office instead relied on the non-obviousness requirements of section 103, the Supreme Court, if it still chose to grant certiorari,\footnote{109 A rejection for obviousness, overturned by the CCPA, would not have been likely to command the same degree of attention engendered by the decision based on statutory subject matter. The question of software patentability per se was one with which the patent bar and computer industry were greatly concerned and which had never been before the Court. See note 11 supra. The CCPA's express limitation of its holding to the issue of statutory subject matter made the case an ideal vehicle by which the Court could express its policy on the software issue.} could have reached the same result without
hurdling the inconsistencies attending the mental process doctrine. Although a patentable invention need no longer be the product of a "flash of genius," it is at least arguable that the manipulation of numbers contemplated by the Benson claims would have been obvious to someone with expertise in the applicable arts—viz., mathematics and computer programming.

The policy-implementing results of the obviousness analysis and the mental process test are not dissimilar. Both prevent public deprivation of the benefits of a phenomenon otherwise available absent any contribution by a would-be patentee. Section 103 recognizes that a non-obvious discovery would be unlikely to reach the public absent disclosure by the inventor and that a patent on it, therefore, deprives the public of nothing to which it would otherwise have access. Analysis under the obviousness standard is necessarily conducted on a case-by-case basis. The mental process doctrine, on the other hand, proceeds from the assumption that a patent on an abstract idea, by its nature, creates a monopoly so broad as to preclude use, by another, of a subsequent discovery made without any assistance from the patentee's disclosure. Unlike the obviousness test, the mental process doctrine is as broad and sweeping as the evil it purports to deter.

Consequences of Benson

The unequivocal Benson ruling that classification as a mental process is, per se, sufficient grounds for rejection promises to promote two evils. First, it impedes any incentive to public disclosure of non-obvious processes which might otherwise never be put to beneficial use merely because these processes are capable of performance by the

111 Of course, obviousness must be determined as of the time of invention, and not afterwards. The use of hindsight is not permissible in determining the question of obviousness. Cf. Goodyear Tire & Rubber Co., Inc. v. Ray-O-Vac Co., 321 U.S. 275, 279 (1944).
113 See 409 U.S. at 68.
114 As examples of possible uses of the Benson invention, the Court listed operation of a train, verification of driver's licenses and researching of law books for precedents. Id. Each of these applications, like dialing a telephone, involves entering multi-digit numbers, one digit at a time, for electronic data processing. However the mere fact that the Benson invention is useful in accomplishing these tasks does not preclude their achievement by other means. It does not, therefore, follow that a patent on the Benson process would provide the inventor with a monopoly on any of the above operations.

114 The nature and range of mental processes is diverse and wide. See, e.g., notes 29-31 and accompanying text supra. To broadly categorize all processes somehow related to
human mind.\textsuperscript{115} Second, it encourages inventors, in drafting their claims, to synthesize artificial apparatus by which to camouflage their inventions for fear of rejection as mental processes.\textsuperscript{116} A strict application of the more discriminatory non-obviousness requirement could eliminate the difficulties encountered in application of the mental process doctrine.\textsuperscript{117}

Rather than alleviating the confusion which has pervaded the issue of software patentability, the Court's reasoning in \textit{Benson} may have added to it. A review of the cases through \textit{Benson} shows that, in general, processes held patentable have satisfied one of the following three criteria:

1. the process is executed on a specific physical apparatus;\textsuperscript{118}
2. the chemical and/or physical phenomena which govern the process place suitable limitations upon it;\textsuperscript{119} or

mental steps as non-patentable, without consideration of the individual merits of each, is to discard the baby with the bath water. Often, what on its surface appears to be principally a mental process, is not. This error is all too frequently made with respect to computer processes. See Bender, \textit{Computer Programs: Should They Be Patentable?}, 68 COLUM. L. REV. 241, 257 (1968).

\textsuperscript{115} See Bender, \textit{Computer Programs, supra} note 114, at 244-48.
\textsuperscript{116} \textit{President's Comm'N, supra} note 85, at 13. On April 8, 1965, the President's Commission on the Patent System was organized to examine the United States patent system in view of the then current state of technology, and to make appropriate recommendations for modernizing the system. Exec. Order No. 11,215, 3 C.F.R. 299 (1965). The Commission addressed itself, \textit{inter alia}, to the problem of software patentability. It expressly criticized inventors' attempts to circumvent the non-statutory subject matter bar to patentability by drafting software claims as processes on programmed machines. To alleviate this problem, the Commission recommended statutory language which would exclude such claims from the scope of patentable subject matter. The following language was suggested:

\textit{The classes of patentable subject matter shall continue as at present except:}

3. A series of instructions which control or condition the operation of a data processing machine, generally referred to as a "program," shall not be considered patentable regardless of whether the program is claimed as: (a) an article, (b) a process described in terms of the operations performed by a machine pursuant to a program, or (c) one or more machine configurations established by a program.

\textit{President's Comm'N at 12.}

The administration's attempt to implement the Commission's recommendations through appropriate legislation appears to have failed. Although legislation barring patents for computer programs was introduced in both houses (see S. 1042, 90th Cong., 1st Sess. (1967); H.R. 5924, 90th Cong., 1st Sess. (1967)), the bills were revised and the most recent Senate version made no reference to the software patentability problem. See S. 643, 92d Cong., 1st Sess. (1971).

\textsuperscript{117} Any monopoly granted for non-obvious mental processes could be further limited to prohibit only commercial exploitation by creation of an exception analogous to the court-created fair use doctrine applied in conjunction with the copyright laws. See 2 NIMMER ON COPYRIGHT § 145 (1972). For a proposed legislative solution to the software protection problem which borrows from the copyright laws, see Galbi, \textit{Proposal for New Legislation to Protect Computer Programming}, 17 BULL. COPYRIGHT SOC'Y 280 (1970).

\textsuperscript{118} See, e.g., The Telephone Cases, 126 U.S. 1 (1887).
(3) the process operates on a physical object so as to change it to a different physical state.\textsuperscript{120}

However, these enumerated criteria offer little guidance to the potential software patentee. Satisfaction of one of the above criteria is no guarantee of patentable subject matter. For example, claim eight of the \textit{Benson} application limited the process to implementation on a re-entrant shift register.\textsuperscript{121} Failure to meet any of these criteria does not, on the other hand, necessarily exclude a process from the realm of patentable subject matter. For, as the \textit{Benson} Court expressly stated:

\begin{quote}
We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents.\textsuperscript{122}
\end{quote}

This residue of uncertainty evinces the serious drawbacks of the mental process doctrine which would have been better left to fade into obscurity.

\section*{Conclusion}

The majority opinion in \textit{Benson} was the sole opinion. There were no concurrences nor did any of the six participating Justices dissent. Why there was so little room for disagreement among Justices who have rarely hesitated to express varying and diverse views on the legal questions presented to them is subject to speculation. The lack of concurring or dissenting opinions is particularly curious in light of the fact that the five CCPA judges had unanimously reached the opposite conclusion.

In examining the treatment that the Court accorded its first software patent case and in projecting its effect upon future similar situations, it is important to distinguish two basic issues. One is the policy question of whether computer processes, a class of inventions of which the \textit{Benson} discovery is but one example, \textit{should} be afforded the protection of the patent laws. In contrast is the question of whether the \textit{Benson} invention is, \textit{per se}, patentable under the currently applicable Patent Act of 1952. The former is an issue for the legislature to resolve. It is only the latter question which the courts have jurisdiction to determine. Notwithstanding the severability of these two issues, the Court confounded the two, thereby permitting its attention to be diverted from the merits of the \textit{Benson} claims vis-à-vis the 1952 Act. Unlike the CCPA, the Supreme Court devoted little space to consideration of the details of the claims in issue. It made no distinction between the two

\begin{footnotes}
\begin{enumerate}
\item[120] See, e.g., Expanded Metal Co. v. Bradford, 214 U.S. 366 (1908).
\item[121] See note 65 supra.
\item[122] 409 U.S. at 71.
\end{enumerate}
\end{footnotes}
claims. No significance was attributed to the fact that one claim was restricted to signals processed on a re-entrant shift register (thereby at least arguably removing it from the mental process proscription) while the other was couched in more abstract terms.\(^{123}\)

Instead of applying the law enunciated by the Patent Act and the consistent line of software cases decided thereunder,\(^ {124}\) the Court expressed apprehension over the Patent Office's present ability to handle an increased workload and cast its opinion in the mold of executive committee proposals for future legislation.

The circular reasoning by which the Court found itself incompetent to apply Patent Act protection to software was based on the fallacious premise that the Act excludes computer processes from its scope. "It may be that the patent laws should be extended to cover these programs,"\(^ {125}\) Justice Douglas wrote for the majority while concluding that this was "a policy matter to which we are not competent to speak."\(^ {126}\)

The software issue cannot, however, be dismissed with such a blithe assumption of nonpatentability since the currently applicable patent statute makes express provision for process patents.\(^ {127}\) The additional requirement of confinement to a specific apparatus which the courts have engrafted on the process provision was clearly met in claim eight. Therefore, it was the Court's function to explain why computer programs do not fall within the "process" category listed in the Patent Act. In assuming as a premise the very rule it sought to prove the Court failed in its mission.

The unanimity of the presiding Justices is best attributed to apprehension over the ramifications attending an opinion favorable to the validity of software patents. It is true that little doubt exists that an affirmative resolution of the issue would be followed by a substantial influx of software applications to the Patent Office. Assuming \textit{arguendo}
that this would necessitate development of new classification and search techniques as well as expansion of the Patent Office labor force and facilities, these factors, no matter how distracting, should not govern judicial decision in an area preempted by statute.

Aware of the potentially broad economic consequences of an affir-

mance and fearful of assuming responsibility for the attending repercus-
sions, the Court took the position most akin to the status quo. In so
doing, it contravened its express belief that Congress is the govern-
mental branch best suited to determine the software patentability ques-
tion. Taking the path of least resistance, the Court not only permitted
conjectured Patent Office inconvenience to becloud a determination on
the merits but also usurped authority delegated exclusively to Congress.

Of what consequence is the Benson decision on the issue of soft-
ware patentability? As a model to which future cases may be analogized,
it is deficient for lack of analysis and, as an expression of the current
law, it is inconsistent with the legislature's exercise of its constitution-
ally mandated authority. The holding will, of course, have precedential
value when the software patent issue is again litigated in the courts be-
low. However, it will be the Court's supervisory power rather than its
appellate wisdom that will dictate future results. The CCPA, in partic-
ular, after devoting substantial judicial effort to the formulation of a
body of law consistent with both the pre-software "method" cases and
the Patent Act, must now feel constrained to reverse its stance absent
any rational legal basis for so doing other than its inferior position in
the judicial hierarchy.

The arguments, both pro and con, over the advisability of patent-
ing software have been given more than ample space in the relevant
literature\textsuperscript{128} and have, therefore, not been re-analyzed here. The patent
bar and software developers have proffered sound reasons favoring soft-
ware patents and the hardware manufacturers have pressed equally
sound opposing arguments. However, if there are to be any limitations
on the scope of inventions which may be afforded protection as pro-
cesses under the express provisions of the Patent Act, Congress must
enact them. The confusing debris of scattered precedent that Benson
leaves in its wake mandates an unequivocal congressional declaration
on the subject of software patentability.\textsuperscript{129}

\textit{—— Howard F. Mandelbaum}
SOFTWARE PATENTABILITY

EPILOGUE

As this article goes to press the Court of Customs and Patent Appeals has just handed down its first post-Benson decision excluding mathematical formulas and mental processes from the realm of statutory subject matter. In In re Christensen, 178 U.S.P.Q. 35 (C.C.P.A. 1973), the court, constrained by Benson, affirmed the Patent Office's rejection of claims on a process for determining subsurface porosity while obviating the necessity for removal and direct measurement of core samples.

The forecasted confusion over the Supreme Court's inadequate analysis of the Benson claims is no longer prophesy:

The Supreme Court in Benson appears to have held that claims drafted in such terms are not patentable — for what reason remaining a mystery. Under the rules of the legal game, we are obliged to follow its lead as best we can.

But for the Benson decision, I would reverse the rejection here ....

Id. at 39 (Rich, J., concurring).

Presently available protection of the copyright laws have been rejected as inadequate. Computer programs are susceptible to translation into other programming and machine languages, rearrangement of steps, and various other alterations which, under the copyright laws, might permit theft of a software invention's substance without adoption of its form. See generally Felsman, Crisman, Hope, Holder & Medlock, Computer Program Protection, 34 Texas B.J. 33, 35-40, 53 (1971); Note, Computer Programs and Proposed Revisions of the Patent and Copyright Laws, 81 Harv. L. Rev. 1541, 1550 (1968). Patent law precludes similar theft of an invention's substance through use of the doctrine of equivalents. See Comment, Infringement and Assembly Abroad—Patent Protection Takes a Vacation in Deepsouth, 47 St. John's L. Rev. at 662 & nn.34-37 (1973).