Human Ingenuity: A Novel Standard for Patenting Algorithms

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HUMAN INGENUITY: A NOVEL STANDARD FOR PATENTING ALGORITHMS

I. INTRODUCTION

As the Twentieth Century draws to a close, society continues to understand and assimilate a new and powerful technology: computers. Computer technology has already revolutionized several industries and professions.\(^1\) Now a multibillion dollar industry, its rapid expansion continues unabated.\(^2\) Its ever increasing intrusion into everyday life appears limitless, and commentators believe computer technology will usurp the present social structure.\(^3\)

Fear of misappropriation has caused many developers of computer technology to seek proprietary rights in their inventions.\(^4\) Intellectual property law has long provided the

1. COMPETING VISIONS, COMPLEX REALITIES: SOCIAL ASPECTS OF THE INFORMATION SOCIETY 33 (J. Schement & L. Lievrouw eds. 1987) ("The convergence of telecommunications and computing technologies distribute information automation to the limits of the world's communication networks."); see also Samuelson, Benson Revisited: The Case against Patent Protection for Algorithms and Other Computer Program-Related Inventions, 39 EMORY L.J. 1025, 1115 (1990) (programs known as Expert System Programs are presently used to make decisions in the fields of law, mathematics, medical diagnoses, meteorology, investment analysis, agriculture, and chemistry).


3. COMPETING VISIONS, COMPLEX REALITIES: SOCIAL ASPECTS OF THE INFORMATION SOCIETY 116 (J. Schement & L. Lievrouw eds. 1987) ("The increased access and control of information that computer technology creates will interact with material wealth to change the present social stratification.").

4. R. Nimmer, THE LAW OF COMPUTER TECHNOLOGY ¶ 1.03 (1985) ("commercial value coupled with relative ease of reproduction leads to substantial levels of unauthorized copying and distribution" of software); see also S. Mandell, COMPUTERS, DATA PROCESSING, AND THE LAW, 160 (1984) ("Those with access to a system's program library can easily obtain copies for their own use or, more frequently, for resale to a competitor. Technical security measures . . . are of little use . . ."); J. Vergari & V. Shue, FUNDAMENTALS OF COMPUTER HIGH-TECHNOLOGY LAW, §12.02 at 523-524 (1991) ("New [computer] technology and attempts by manufacturers and vendors to protect it have resulted in numerous cases involving the application of trade secret, patent, and copyright law . . . to computer products and programs."); Kidwell, Software and Semiconductors: Why Are We Confused?, 70 MINN. L. REV. 533, 533 (1985) (explaining that both software and semiconductors are expensive to develop but inexpensive to duplicate).
necessary protection. However, a critical area of computer technology, algorithms, remains unprotected. Construing the 1952 Patent Act narrowly, the Supreme Court has adopted a per se rule against patenting algorithms. Applying this restrictive standard of patentability, the Court has determined that algorithms are like a law of nature and thus are not within the categories of patentable subject matter listed in 35 U.S.C. § 101.

The Court seems to have stumbled in its approach to determine the patentability of algorithms by becoming trapped in a categorical quagmire. Yet, in other areas of patent law, the Court has developed standards to avoid categorical schemes. Adopting a less restrictive standard of patentability, the Court has developed a non-categorical approach to determine the patentability of biotechnological inventions. Decisions concerning patents for living organisms provide the best example.

Determining that living organisms were the result of discovery and not invention, early patent law precluded them from patent protection. Categorizing such organisms as products of nature, the patent system adopted a per se rule against affording patent protection to these organisms regardless of the amount of human intervention required to reduce them to a useful product. Modern biotechnology patent law now

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5. See M. Gemignani, COMPUTER LAW §39:7 (1985) (explaining that although it is left unprotected, "the algorithm is often the most important aspect of the program and that which its creator most wants to protect"); see also J. Vergari & V. Shue, FUNDAMENTALS OF COMPUTER HIGH-TECHNOLOGY LAW, §12.02 at 523 (1991) (by precluding "ideas, scientific discoveries, and mathematical formula" from patent protection, the Court has left algorithms unpatentable); Chisum, The Patentability Of Algorithms, 47 U. Pitt. L. Rev. 959, 960 (1986) (explaining that "the current state of the law is that 'mathematical' algorithms 'as such' or 'in the abstract' do not constitute patentable subject matter").

6. J. Vergari & V. Shue, FUNDAMENTALS OF COMPUTER HIGH-TECHNOLOGY LAW, §12.02(b)(1)(D) at 540 (1991) (algorithms are one of "several court created exceptions to the statutory definition of patentable subject matter"); compare 35 U.S.C. § 101 (1991) (provides that "[w]hoever invents or discovers any new and useful process . . . may obtain a patent therefor"). The controversy centers around whether an algorithm is a patentable process under the 1952 Patent Act. See generally infra notes 26-64 and accompanying text.

7. See Thorne, Relation of Patent Law to Natural Products, 6 J. PAT. OFF. Soc'y 23, 24-25 (1923) ("It will be further seen from the decisions that plants and animal organisms . . . are not the proper subject matter for patent protection" because they exist independent of human effort. (construing Wall v. Leck 66 F. 552 (9th Cir. 1895)); see also Ex parte Latimer, 1889 Dec. COMM'R Pat. 123 (this is the seminal case in which the patent office articulated its policy of precluding products of nature from patent protection).
recognizes that living organisms can constitute patentable subject matter if they are "a product of human ingenuity."  

This Comment advocates that the Court afford patent protection to algorithms by adopting the standard of patentability applied in biotechnology patent law: human ingenuity. Part II describes some fundamental aspects of computer technology. Part III discusses the current state of patent law concerning patenting algorithms. Part IV demonstrates that the Court's restrictive standard of patentability is not consistent with case precedent. Part V describes how the Court's policy of precluding algorithms from patent protection subverts the patent system. Part VI explicates a standard of patentability, human ingenuity, and describes how this standard would return predictability to the patent system.

II. LOGICAL EQUIVALENCY

There are three distinct areas of computer technology: hardware, software, and algorithms. Hardware consists of physical devices: integrated circuits, video monitors, keyboards, and wired interconnectors. Software, often found on punchcards, disks, magnetic tapes and various other media, is a sequence of instructions that directs the Central Processing Unit (CPU) and other peripheral hardware in their respective


9. M. GEMIGNANI, COMPUTER LAW § 2:1 (1985) ("Hardware is what makes a dent in the floor when dropped. . . . Hardware does refer to the physical, the tangible, the more concrete-the machine portions of a computer system."); see also, J. VERGARI & V. SHUE, FUNDAMENTALS OF COMPUTER-HIGH TECHNOLOGY LAW, §1.01(c) at 6 (1991) (describing hardware as "all of the tangible physical parts that make up a computer"); see United States v. Seidlitz, 589 F.2d 152 (4th Cir. 1978), cert. denied, 441 U.S. 922 (1979) (hardware is the "tangible machinery of the computer").


There are several stages in the design of a program. At the program's inception, a programmer will create a block diagram or flow chart. This serves as an outline of a specific series of steps that the program must perform to enable the computer to perform its task. At a stage subsequent to this, the program will be converted into a language that the computer can use, e.g., Basic, C, Pascal. Generally, it is these high level languages that are stored on magnetic media in the form of ones and zeros. See generally R. NIMMER, THE LAW OF COMPUTER TECHNOLOGY ¶ 1.03[2] (1988) (Nimmer explains the general process behind creating a program).
functions. Definitions of an algorithm vary from that of a "recipe, method, directions, and routine" to a more formal definition, adopted by the Supreme Court, of "an unambiguous, ordered sequence of steps that leads to the solution of a given problem."

Much of the confusion in computer related law results from the similarity of hardware, software, and algorithms. "Any precisely defined algorithm . . . may be realized in [both] hardware," and software. No definitive rule exists that mandates which functions are manifested in hardware and which in software. Designers consider factors such as cost, speed, and reliability when deciding which functions to fabricate in either hardware or software. For example on early computers the ADD instruction was originally executed through the use of hardware. Present day programmable microcomputers (commonly known as PCs), perform this instruction through the use of software. In effect because hardware and software can both express algorithms, they are logically equivalent.

11. J. TREMBLAY & R. BUNT, AN INTRODUCTION TO COMPUTER SCIENCE: AN ALGORITHMIC APPROACH 28 (1981); see also J. VERGARI & V. SHUE, FUNDAMENTALS OF COMPUTER HIGH-TECHNOLOGY LAW, §1.02(c) at 7 (1991) (software is a "collection of computer instruction sets that tell the hardware what to do; each set is called a program"). There are generally two types of computer programs: application programs, and operating system programs. Application programs are those that are designed to accomplish a specific task, e.g., WordPerfect (word processor), Lotus 1-2-3 (spread-sheet), and Q-Modem (communications). Operating system programs enables the hardware to work synergistically, e.g., MS-DOS, 4DOS, UNIX. See id. at § 12.02(c)(1)(B), at 554.

12. W. SAVITCH, TURBO PASCAL 4.0/5.0 AN INTRODUCTION TO THE ART AND SCIENCE OF PROGRAMMING 8 (1989).


14. See M. GEMIGNANI, COMPUTER LAW § 2:1 (1985); compare Davidson, Common Law, Uncommon Software, 47 U. PIT. L. REV. 1037, 1040-1041 (1986) ("Software inundated the United States legal system with such force in such a short amount of time that it is surprising the confusion is not more rampant. Software was first thought of as patentable . . . then though of as not patentable; now it is considered as patentable again.").

15. T. PRATT, PROGRAMMING LANGUAGES: DESIGN & IMPLEMENTATION 19 (2d ed. 1983) ("Hardware and software lie on a continuum from the more concrete to the more abstract."); see also M. GEMIGNANI, COMPUTER LAW § 40:1 (1985) [it is possible to build a chip which contains precisely those circuits which define [a] program]; W. SAVITCH, TURBO PASCAL 4.0/5.0 AN INTRODUCTION TO THE ART AND SCIENCE OF PROGRAMMING 8 (1989) (describing a program as an algorithm expressed in computer language).


17. Id. The ADD instruction is as it sounds. It adds binary numbers in the CPU. See infra note 30 for an explanation of binary numbers.

III. CURRENT STATE OF THE LAW

A. COPYRIGHT PROTECTION VERSUS PATENT PROTECTION

The Constitution empowers Congress to provide for the protection of computer technology.19 By classifying computer programs as literary works, 17 U.S.C. § 102(a)(1) extends copyright protection to the expression of the ideas contained in them.20 Usually, hardware is not protected by copyright law because of its utilitarian qualities.21 Patent protection is generally the appropriate means to protect proprietary interests in hardware.

Patenting algorithms would have distinct advantages over copyrighting them. Unlike copyright law, patent law affords an inventor a monopoly which increases the patent holder's ability to license and market the technology.22 For an invention to be amenable to patent protection, it must demonstrate novelty, utility, and it must not be obvious.23 This standard of patentability was once thought to be a talisman: obviating the problems encountered by the patent office when determining the patentability of an invention.24 However, as this

19. See U.S. Const. art. I, § 8, cl. 8 ("To promote the progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries . . . .").
22. 35 U.S.C. § 154 ("Every patent . . . shall grant to the patentee . . . for the term of seventeen years . . . the right to exclude others from making, using, or selling the invention throughout the United States . . . ."); see L.J. Kutlen, Computer Software Protection/Liability/Law/Forms ¶3.02[5] (1988) (explaining that patent protection provides more clout in marketing an invention than copyright).
23. See 35 U.S.C. § 101 (1991) ("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."); 35 U.S.C. § 102 (1991) (describes in detail the situations in which an invention will fail the novelty requirement); 35 U.S.C. § 103 (1991) ("A patent may not be obtained though the invention is not identically disclosed . . . if the differences between the subject matter sought to be patented and the prior art . . . would have been obvious at the time the invention was made to a person having ordinary skill in the art . . . ."); see also Bailey, Progress as a Requirement to Patentability, 42 J. Pat. Off. Soc'y 223 (1960) (this an excellent analysis of the requirements for patentability under the 1952 Patent Act).
24. See infra notes 95-101 and accompanying text.
Comment shall show, this standard of patentability has varied depending upon the invention sought to be patented.26

B. CASE LAW CONCERNING COMPUTER TECHNOLOGY PATENTS

Patent cases involving algorithms have substantially confused the modern standard of patentability. Gottschalk v. Benson was the first Supreme Court case to address the issue of patenting algorithms.28 There were two claims of a patent application in question: claims number 8 and 13. Claim number 8 described a method of storing binary coded signals in a re-entrant shift register.27 The application described claim number 13 as a "data processing method for converting binary coded decimal number representations into pure binary."28 Taken together, the Court found that the two claims

26. 409 U.S. 63, 93 S.Ct. 253, 175 U.S.P.Q. (BNA) 673 (1972); see Chisum, The Patentability of Algorithms, 47 U. Pitt. L. Rev. 959, 972 (1986) (Chisum points out that Benson is the 'sole source of the apparent rule against patenting algorithms').
27. Claim 8 reads:
   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.
28. Claim 13 reads:
   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) 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;
recited an algorithm for converting binary coded decimal numbers (BCD) into pure binary numbers. A binary coded decimal (BCD) is an intermediate step between decimal numerals and binary numerals.

In his opinion, Justice Douglas considered whether the algorithm was a patentable process within the meaning of the 1952 Act, but he never answered this inquiry. Refusing to determine whether the invention claimed demonstrated novelty, utility, and nonobviousness, he found that the patentability of the

(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.


29. Id. at 65, 93 S. Ct. at 254, 175 U.S.P.Q. (BNA) at 674.

30. The Court explained binary numbers as follows:

The pure binary system of positional notation uses two symbols as digits 0 and 1, placed in a numerical sequence with values based on consecutively ascending powers of 2. In pure binary notation, what would be the tens position is the twos position; what would be hundreds position is the fours position; what would be the thousands position is the eights. Any decimal number from 0 to 10 can be represented in the binary system with four digits or positions as indicated in the following table.

<table>
<thead>
<tr>
<th>Shown as the sum of powers of 2</th>
<th>Pure</th>
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<tbody>
<tr>
<td>$2^0$ $2^1$ $2^2$ $2^3$ $2^4$</td>
<td></td>
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<tr>
<td>Decimal</td>
<td>(8)</td>
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<td>0</td>
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<td>9</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

The BCD System using decimal numerals replaces the character for each component decimal digit in the decimal numeral with the corresponding four-digit binary numeral, shown in the right-hand column of the table. Thus decimal 53 is represented as 0101 0011 in BCD, because decimal 5 is equal to binary 0101 and decimal 3 is equivalent to binary 0011. In pure binary notation, however, decimal 53 equals binary 110101.

Id. at 66-67, 93 S. Ct. at 255, 175 U.S.P.Q. at 674-675.

31. Id. at 64, 93 S. Ct. at 254, 175 U.S.P.Q. (BNA) at 674; compare 35 U.S.C. §100(b) (1991) (defining a process as a "process, art, or method").
invention was better left to Congress for resolution because the Court was not adequately equipped to render an opinion. In support of his deference to Congress, Justice Douglas found that the claim was unpatentable. Although his holding was convoluted, the author contends that Justice Douglas determined the claim reciting the algorithm was not amenable to patent protection because it failed to satisfy the requirements of section 112. However, subsequent decisions have failed to demonstrate a consistent interpretation of the Benson holding.

Parker v. Flook, was the second case in which the Court addressed the patentability of a claim that recited an algorithm. The patent at issue was for a process of updating alarm limits on a catalytic conversion of hydrocarbons. The process contained three steps: measuring the value of the process temperature; calculating the updated alarm-limit value through use of an algorithm; and adjusting the alarm limit to the updated value.

In his opinion, Justice Stevens interpreted Benson as holding that algorithms are not patentable per se. In support of this per se rule, Justice Stevens articulated the rationale that all algorithms were within the prior art, i.e., not

32. See id. at 71-72, 93 S. Ct. at 258, 175 U.S.P.Q. (BNA) at 677.
33. See infra notes 102-114 and accompanying text.
35. Id. at 586, 98 S. Ct. at 2523, 198 U.S.P.Q. (BNA) at 195.
36. Id.
37. "Claim 1 of the patent describes the method as follows:
   '1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of Bo + K
   'wherein Bo is the current alarm base and K is a predetermined alarm offset which comprises:
   '(1) Determining the present value of said process variable, said present value being defined as PVL;
   '(2) Determining a new alarm base B1, using the following equation:
       B1 = Bo(1.0-F) + PVL(F)
   'where F is a predetermined number greater than zero and less than 1.0;
   '(3) Determining an updated alarm limit which is defined as B1 + K; and thereafter
   '(4) Adjusting said alarm limit to said updated alarm limit value."
Id. at 596-597, 98 S. Ct. at 2529, 198 U.S.P.Q. (BNA) at 200.
38. Id. at 585, 98 S. Ct. at 2523, 198 U.S.P.Q. (BNA) at 195.
Finding that the algorithm was the only element of the invention not used before in other catalytic conversions, he held the claim not proper for patent protection because it lacked novelty. He went further and adopted a very hostile view toward patenting algorithms by declaring that Congress must act affirmatively before these types of inventions become amenable to patent protection.

The confusion concerning what standard of patentability to apply to computer technology patents began to manifest itself in the lower courts following the Flook decision. With little guidance from the Supreme Court, the Court of Customs and Patent Appeals developed a two-part test, the Freeman test, to determine if a claim, reciting an algorithm, was amenable to patent protection. Under this test, a court must first determine whether a claim recites an algorithm as defined in Benson. If such an algorithm is present, the next step is to determine if the claim "wholly preempted" the algorithm, and if it does, the claim is invalid. Apparently, the Court of Customs and Patent Appeals ignored the finding in Flook that all algorithms were part of prior art.

39. Id. at 594, 98 S. Ct. at 2527-2528, 198 U.S.P.Q. (BNA) at 199. This approach is often called the "point of novelty". For an analysis of this approach, see Comment, 62 J. PAT. OFF. Soc'y 521 (1980). The reader should note that the Court rejected this test for determining patentability in Diamond v. Diehr. See infra note 59 and accompanying text.

40. Id. at 594, 98 S. Ct. at 2527-2528, 198 U.S.P.Q. (BNA) at 199. See infra note 109 and accompanying text.

41. Id. at 596, 98 S. Ct. at 2528, 198 U.S.P.Q. (BNA) at 200 ("We would require a clear and certain signal from Congress before approving the position of a litigant who, as respondent here, argues that the beachhead of privilege is wider, and the area of public use narrower, than courts had previously thought." (quoting Deepsouth Packing Co. v Laitram Corp., 406 U.S. 518, 531, 92 S.Ct. 1700, 1708, 173 U.S.P.Q. (BNA) 769, 774))).


44. 573 F.2d at 1245, 197 U.S.P.Q. (BNA) at 471. This prong of the test was probably a response by the C.C.P.A. to the dictum in Benson that explained how the claim in that case, if found patentable, would preempt the algorithm. See infra note 109 and accompanying text.

45. Id. at 1245, 197 U.S.P.Q. (BNA) at 471.
The lower courts' disregard of the *Flook* decision continued in the decision of *In re Walter*.\(^48\) Here, the Court of Customs and Patent Appeals modified the second prong of the *Freeman* test. Abolishing the focus on preemption, the court of Customs and Patent Appeals articulated a standard of patentability for process patents radically different from that espoused in either *Benson* or *Flook*. The court here required that the invention, of which an algorithm is part, must be tangible in order for the claim to be the proper subject of a patent.\(^47\)

Subsequent to the *Walter* decision, the Supreme Court rendered its most recent decision concerning the patenting of algorithms in *Diamond v. Diehr*.\(^48\) Relying on *Benson*, Justice Rehnquist expressly held that algorithms were not the proper subject for patent protection because they were like a law of nature.\(^49\) Justice Rehnquist specifically rejected the reasoning in *Flook* that algorithms were not patentable because they were not new.\(^50\) He asserted that "[t]he novelty of any element or steps in a process . . . is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter."\(^51\)

The claimed invention at issue in *Diehr* was a process for molding raw uncured synthetic rubber into cured precision products.\(^52\) Many steps in this process used an algorithm, the Arrhenius equation, to calculate the correct time to open the press.\(^53\) The Court here distinguished this case from *Benson*.

\(^{47}\) Id. at 767, 205 U.S.P.Q. (BNA) at 406 (a claim containing a mathematical algorithm would be patentable if the algorithm specifically defined structural relationships between physical elements of an apparatus claim, or limited claim steps in a process claim).
\(^{49}\) Id. at 186, 101 S.Ct. at 1056, 209 U.S.P.Q. (BNA) at 8 (1981) ("We defined an 'algorithm' as a 'procedure for solving a given type of mathematical problem,' and we concluded that such an algorithm, or mathematical formula, is like a law of nature, which cannot be the subject of a patent.").
\(^{50}\) Id. at 188-189, 101 S.Ct. at 1058, 209 U.S.P.Q. (BNA) at 9.
\(^{51}\) Id.
\(^{52}\) Id. at 177 n.1, 101 S.Ct. at 1052 n.1, 205 U.S.P.Q. (BNA) at 4 n.1 ("[A] 'cure' is obtained by mixing curing agents into the uncured polymer in advance of molding and then applying heat over a period of time. If the synthetic rubber is cured for the right length of time at the right temperature, it becomes a usable product.").

53. The language of the court is as follows:

The equation is named after its discoverer Svante Arrhenius and has long been used to calculate the cure time in rubber-molding presses. The equation can be expressed as follows:

\[
\ln v = CZ + x
\]
and *Flook* by finding that the invention here was applied to a process. In his decision, Rehnquist stated that the patent was valid even though its claims recited an algorithm because the algorithm applied to a "process which . . . [was] performing a function the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing). . . ." However, Rehnquist failed to articulate a standard by which the lower courts could determine whether an algorithm was applied in a process so that it would be amenable to patent protection.

Shortly following the *Diehr* decision, the Court of Customs and Patent Appeals, in the decision of *In re Abele*, again modified the second prong of the *Freeman* test. The *Abele* decision permitted examining claims without the algorithm to determine if what remained was statutory subject matter. If what remained was statutory subject matter, the claim reciting the algorithm would be patentable only if the algorithm applied to a process step. Applying this analysis, an examiner or court would entirely omit an algorithm from consideration when determining whether a claim was patentable. The Court, in *Abele*, found the claim at issue patentable because "absent the algorithm, the steps present would result in a conventional CAT-scan process." The algorithm was not used merely to solve a mathematical equation, rather it was incorporated into a larger process to produce an improved Cat-scan.

\[
\begin{align*}
\text{wherein } & \ln v \text{ is the natural logarithm of } v, \text{ the total required cure time;} \\
C & \text{ is the activation constant, a unique figure for each batch of each compound being molded, determined in accordance with rheometer measurements of each batch;} \\
Z & \text{ is the temperature in the mold;} \text{ and } x \text{ is a constant dependent on the geometry of the particular mold in the press. A rheometer is an instrument to measure flow of viscous substances.}
\end{align*}
\]

*Id.* at 177-178 n.2, 101 S. Ct. at 1058 n.2, 209 U.S.P.Q. (BNA) at 4 n.2.

54. See *id.* at 192, 101 S. Ct. at 1059-1060, 209 U.S.P.Q. (BNA) at 10. This statement can be interpreted as an implicit adoption, by the Supreme Court, of the physicality requirement espoused in *Walter*.


56. *Id.* at 907, 214 U.S.P.Q. (BNA) at 686.

57. *Id.*

58. *Id.* at 908, 214 U.S.P.Q. (BNA) at 687 (the algorithm was used merely to obtain a higher resolution CAT-scan thereby making images of internal organs and bones easier to recognize).

59. The language of the court was as follows:

The algorithm . . . is merely applied to the "attenuation data" to eliminate what would otherwise appear as artifacts. . . . What appellants have done is to discover an application of an algorithm to process steps which are themselves part of an overall process which is statutory. Hence, [the algorithm] cannot be construed as a mere procedure for solving a given mathematical problem.

*Id.* at 908-909, 214 U.S.P.Q. (BNA) at 688.
In re Grams provides the most recent ruling, from the Federal Circuit Court of Appeals (formerly the Court of Customs and Patent Appeals), on a process claim reciting an algorithm. This decision left in a state of confusion, the test for determining whether a claim containing an algorithm is patentable. The process involved gathering data from a patient and using a computer algorithm to compare the gathered data with other pre-determined parameters and thereby determining if a patient's condition was abnormal. The court found that the test articulated in Walter was no longer determinative for ascertaining whether a claim reciting an algorithm is patentable. Finding the claim unpatentable, the court opted for an ad hoc determination as to whether a claim reciting an algorithm was patentable.

The ad hoc standard of patentability applied by the lower courts in recent patent cases, is a result of the Supreme Court's departure, in Diehr, from the long established principal that the novelty and utility of an invention is the touchstone for determining its patentability. In adopting its approach of categorically precluding algorithms from patent protection, the Court in Diehr usurped 200 years of case precedent. Further, it has left in a state of confusion the proper standard of patentability a court must apply.

IV. CONFLICTS WITH TRADITIONAL PATENT LAW

A. EARLY PATENT LAW

Although Diehr asserted that novelty is irrelevant when determining patentable subject matter, an examination of the

60. 888 F.2d 835, 12 U.S.P.Q. (BNA) 2d 1824 (Fed. Cir. 1989).
61. Id. at 836, 12 U.S.P.Q. (BNA) 2d at 1825.
62. "[F]ailure to meet ... [the Walter] test does not necessarily doom the claim." Id. at 839, 12 U.S.P.Q. (BNA) 2d at 1827. "The presence of a physical step in the claim to derive data for the algorithm will not render the claim statutory." Id. at 840, 12 U.S.P.Q. (BNA) 2d at 1828.
63. Id. at 841, 12 U.S.P.Q. (BNA) 2d at 1829. The court never clearly articul­ated its test for determining whether a claim containing a mathematical algorithm was patentable. see Note, The Return Of The Walter Test: Patentability Of Claims Containing Mathematical Algorithms After In re Grams, 76 CORNELL L. REV. 962 (1991) ("After Grams, courts are left to make their own subjective determinations of what the applicants invented.").
64. See Chisum, The Patentability Of Algorithms, 47 U. PIT'T. L. REV. 959, 960 (1986) (explaining "the current state of the law is that 'mathematical' algorithms 'as such' or 'in the abstract' do not constitute patentable subject matter"); see also Samuelson, Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions, 39 EMORY L.J. 1025, 1095 (1990) ("[Without] emphasis ... placed on the industrial nature of Diehr's process it would not have been patentable.").
Patent System's history shows that this is incorrect. In 1790, Congress passed the first Patent Act (1790 Act). The 1790 Act established a permissive standard of patentability. To be amenable to patent protection, the Act stressed that an invention demonstrate novelty and utility. However, almost immediately after the 1790 Act became law, the patent examiners established subsidiary requirements to further refine the standard. Applying these requirements, the examiners precluded from patent protection inventions made in the following manner: a new use of an old invention, a new form or proportion of an old invention, an old invention made with a new material.

66. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That upon the petition of any person or persons to the Secretary of State, the Secretary for the department of war. and the Attorney-General of the United States, setting forth that he, she, or they hath or have invented or discovered any useful art, manufacture, engine, machine, or device, or any improvement therein not before known or used, and praying that a patent may be granted therefor, it shall and may be lawful to and for the said Secretary of State, the Secretary for the department of war. and the Attorney-General, or any two of them, if they shall deem the invention of discovery sufficiently useful and important, to cause Letters of Patent to be made out in the name of the United States . . . . (emphasis added).
67. This is probably attributable to the lack of guidance from the framers of the Constitution in elucidating exactly what types of inventions they intended to protect. See Seidel, The Constitution and a Standard of Patentability, 48 J. PAT. OFF. SOC'y, 5, 17 (1966) (noting that shortly after the Committee of Detail's submission of the intellectual property clause, on 5 September 1787, the Constitutional Convention adopted it without debate).
68. The Department of State administered the 1790 Act. Under that Act, the Secretary of State, Secretary for the Department of War, and the Attorney-removal reviewed all patent applications. Act of April 10, 1790, ch. 7, § 1, 1 Stat. 109-110 (1850), repealed by Act of Feb. 21, 1793 ch. 11, 1 Stat. 318 (1850). It was Thomas Jefferson in his capacity a Secretary of State who was the motivation behind implementing the subsidiary requirements. See Seidel, The Constitution and a Standard of Patentability, 48 J. PAT. OFF. SOC'y, 5, 26 (1966) ("The first 'board' [of patent examiners] comprised Thomas Jefferson, Henry Knox and Edmund Randolph, with Jefferson being the primary movant of the group.").
Jefferson wrote:

[T]hat a machine of which we were possessed, might be applied by every man to any use of which it is susceptible, and that 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. Another rule was that a change
nary to preclude a combination of known elements from patent protection.\textsuperscript{69} The task of examining patents quickly became overly burdensome for the examiners.\textsuperscript{70} With the passing of the Patent Act of 1793 (1793 Act), Congress abolished the examination.

The 1793 Act further lowered the standard of patentability making patent protection more permissive than it was under the 1790 Act. It decreased the 1790 Act's utility requirement by abolishing the criteria that an invention be "sufficiently useful and important."\textsuperscript{71} The act also codified the

of material should not give title to a patent: As the making of a ploughshare of cast rather than of wrought iron; a comb of iron instead of horn or of ivory, or the connecting buckets by a band of leather rather than of hemp or iron. A third was that a mere change of form should give no right to a patent, as a high-quartered shoe instead of a low one; a round hat instead of a three-square; or a bucket instead of a round one. But for this rule, all the changes of fashion in dress would have been under the tax of patentees.


\textsuperscript{69} Jefferson wrote:

\begin{quote}
[I]f we have a right to use three things separately, I see nothing in reason, or in the patent law, which forbids our using them all together. A man has a right to use a saw, an axe, a plane separately; may he not combine their uses on the same piece of wood?
\end{quote}


\textsuperscript{70} Burchfiel, \textit{Revising the "Original" Patent Clause}, 2 HARV. J.L. & TECH. 155, 184 n.170 (1989) ("Jefferson indicated that because of an 'abundance' of applications and the requirement of examination, which required 'more time of the members of the board than they could spare from higher duties, the whole was turned over to the judiciary, to be matured into a system, under which every one might know when his actions were safe and lawful." (quoting a letter to Isaac McPherson Aug. 13, 1813 in VI WRITINGS OF THOMAS JEFFERSON 181-182 (Washington ed. 1814))).

\textsuperscript{71} Act of February 21, 1793, ch. 11, § 1, Stat. 318-321, \textit{repealed by Act of July 4, 1836, ch. 357, Stat. 117 (1853)}

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that when any person or persons, being a citizen or citizens of the United States, shall allege that he or they \textit{have invented any new and useful art}, \textit{machine}, \textit{manufacture}, \textit{or composition of matter}, \textit{or any new and useful improvement on any art, machine, manufacture, or composition or matter, not known or used before the application}, and shall present a petition to the Secretary of State, signifying a desire of obtaining an exclusive property in the same, and praying that a patent may be granted therefore, it shall be made lawful for the said Secretary of State, to cause Letters of Patent to be made out . . . (emphasis added).
subsidiary requirement applied by the patent examiners under the 1790 Act that a patent would not issue for "simply changing the form or the proportions of any machine, or composition of matter." Without the examination process, Congress left to the courts the task of determining what inventions were patentable. From the court decisions that followed, Commentators have found that the courts' principal inquiry for determining patentable subject matter was novelty.

The courts interpreted the subsidiary requirements, applied by the patent examiners under the 1790 act, as a further refinement of the definition of novelty. From the application of these subsidiary requirements, the Courts developed the Substantial Novelty test. Applying this test, the courts focused on the invention, and not the process that brought about its creation, to determine if novelty was present. Under the

72. Id. § 2. The statute read as follows: [T]hat any person who shall have discovered an improvement in the principle of any machine, or in the process of any composition of matter, which shall have obtained a patent for such improvement, he shall not be at liberty to use the improvement; And it is hereby enacted and declared, that simply changing the form or their proportions of any machine or composition of matter, in any degree, shall not be deemed a discovery.

73. See T. FESSENDEN, AN ESSAY ON THE LAw OF PATENTS FOR NEW INVENTIONS, 59-60 (2nd ed. 1822) (describing that novelty was a mitigating factor for determining whether an invention was patentable subject matter and that utility required only that an invention not be "frivolous and mischievous [sic]"); G. CURTIS, A TREATISE ON THE LAw OF PATENTS FOR USEFUL INVENTIONS §§ 16-17, at 16 (1st ed. 1849); see also Burchfiel, Revising the "Original" Patent Clause, 2 HARV. J.L. & TECH. 155, 188 (1989) ("Novelty is the proper first inquiry of the court in weighing patent validity ... ") (construing Earle v. Sawyer 8 F.Cas. 254 (C.C.D. Mass. 1825) (No. 4,247); see, e.g., Bedford v. Hunt, 8 F.Cas. 37, 37 (C.C.D. Mass. 1817) (No. 1,217) ("The law, however, does not look to the degree of utility; it simply requires, that it shall be capable of use, and that the use is such as sound morals and policy do not discountenance or prohibit.").

74. G. CURTIS, A TREATISE ON THE LAw OF PATENTS FOR USEFUL INVENTIONS § 18, at 16 (1st ed. 1849) ("Our courts have, in truth, without using the same terms, applied [the subsidiary requirements when] determining whether alleged inventions ... possess the necessary element of novelty.").

75. See T. FESSENDEN, AN ESSAY ON THE LAw OF PATENTS FOR NEW INVENTIONS, 147 (2nd ed. 1822) ("with regard to what constitutes the identity, or diversity of two machines ... the material question, therefore, is ... whether the given effect is produced substantially by the same mode of operation and the same combination of powers on both machines"); Burchfiel, Revising the "Original" Patent Clause, 2 HARV. J.L. & TECH. 155, 195 (1989). See supra note 28 and accompanying text for the requirements that formed the basis for courts constructing the Substantial Novelty test.

76. G. CURTIS, A TREATISE ON THE LAw OF PATENTS FOR USEFUL INVENTIONS §§ 16-17, at 15 (1st ed. 1849 (explaining that it is the character and purposes of the invention that a court must examine to determine novelty and not the ingenuity of the inventor who created it); see Burchfiel, Revising the "Original" Patent Clause, 2 HARV. J.L. & TECH. 155, 191 (1989) ("[T]he case of a machine, the proper inquiry is whether it has been 'substantially constructed before' and in the case of an improvement, 'whether that improvement has ever been applied to such a machine before, or whether it is substantially a new combination.")
Substantial Novelty test, a device would fail as patentable subject matter if it performed substantially the same function in substantially the same way to obtain substantially the same result as any invention in prior art. In effect, the courts required nothing more than an invention be new and useful to be subject to patent protection. Although the court managed to further refine the standard for patentability with the Substantial Novelty test, eradication of the patent examination made the 1793 Act ineffective. Congress repealed it with the Patent Act of 1836 (1836 Act).

The 1836 Act demonstrated the Patent System's adherence to a relatively permissive standard of patentability. It maintained the requirements for patentability that an invention need nothing more than to be new and useful, but it omitted the provision in the 1793 Act relating to change of form or proportion. The belief being that this provision was redundant because it, as well as the other subsidiary requirements, applied by the patent examiners under the 1790 Act, was subsumed within the Substantial Novelty test. Thus, under the 1836 Act, an invention need demonstrate no more than novelty and utility to be amenable to patent protection. All the patent acts subsequent to the 1836 Act, with the exception of the 1952 Act, preserved the standard of patentability espoused in the 1836 Act.

77. See id. at 192.
78. See Seidel, The Constitution and a Standard of Patentability, 48 J. PAT. OFF. SOC'y 5, 28 (1966) ("Duplications, frauds and frivolous patents were a problem. That Act also failed to provide the incentive to industry and economic growth . . . .").
80. See Burchfiel, Revising the "Original" Patent Clause, 2 HARv. J.L. & TECH. 155, 197 (1989) ("The provision relating to change of form or proportion was eliminated in the 1836 act . . . .").
81. See G. CURTIS, A TREATISE ON THE LAW OF PATENTS FOR USEFUL INVENTIONS §§ 2-4, at 3-4 (1st ed. 1849); see also Burchfiel, Revising the "Original" Patent Clause, 2 HARv. J.L. & TECH. 155, 196-202 (1989) ("E]vidently [these subsidiary requirements were considered] as surplusage and without affecting the patentability standard, since the judiciary continued to apply it as implicit in the [S]ubstantial [N]ovelty requirement.").
82. See Seidel, The Constitution and a Standard of Patentability, 48 J. PAT. OFF. SOC'y 5, 31 (1966) ("P]rior to 1850, the question of whether or not an invention was patentable was determined by the answer as to whether it was novel."). Some commentators believed it necessary to abolish the provision in the 1793 Act that precluded granting patents to inventions that were merely a change of form and proportion. They believed that no precedent existed in patent law that substantiated any requirements for patent protection beyond that of novelty and utility. See G. CURTIS, A TREATISE ON THE LAW OF PATENTS FOR USEFUL INVENTIONS § 16, at 15 n.1 (1st ed. 1849).
B. Development of the Modern Standard of Patentability

Although the patent statutes maintained a standard of patentability that required a patentable invention to demonstrate no more than novelty and utility, in the years before passage of the 1952 Act, the Court developed a more restrictive standard of patentability. Justice Nelson first articulated this standard for the Supreme Court in the 1850 Hotchkiss v. Greenwood opinion. This standard became known as invention.

In Hotchkiss, the Court heard an appeal based on an objection to a trial judge's jury instruction that required the jury to determine a patent's validity based on ingenuity and not Substantial Novelty. The patent at issue was for the manufacture of knobs made from different types of clay and porcelain. Justice Nelson determined that "the only thing new [in the knob's manufacture] is the substitution of a knob of a different material from that heretofore used in connection with this arrangement." He found that the trial judge's jury instruction was proper and refused to apply the Substantial Novelty test to determine the patentability of the claim. In his holding, Justice Nelson articulated that the degree of skill and ingenuity possessed by an ordinary mechanic was the proper threshold standard of patentability. This decision

public policy of a standard for patentability."); see also Kitch, John Deere Co.: New Standard for Patents, 49 J. PAT. OFF. SOC'Y, 237, 242 (1967) (describing that the proper inquiry for determining patentability under the pre 1952 patent acts were novelty and utility).

84. 52 U.S. (11 How.) 248 (1850).
85. A. WALKER, TEXT-Book of the Patent Laws of the United States of America, § 23 (1885). In his book, Walker speaks of this test as a separate requirement independent of the novelty and utility standards. Contemporary commentators continue to debate this topic. The author contends that this standard is not separate from novelty and utility, but is a further refinement of novelty. See infra note 100.
86. 52 U.S. (11 How.) at 264. The trial judge instructed the jury as follows: [If] the knob of clay was simply the substitution of one material for another, the spindle and shank being the same as before in common use, and also the mode of connecting then by dovetail to the knob the same as before in common use, and no more ingenuity or skill required to construct the knob in this way that that possessed by an ordinary mechanic acquainted with the business, the patent was invalid, and the plaintiffs were not entitled to a verdict.

87. Id. at 264-265.
88. Id. at 265.
89. See id. at 267. The heart of the majority's reasoning came from the following: Now if the foregoing view of the improvement claimed in this patent be correct ... unless [there were] more ingenuity and skill in applying the old method of fastening the shank and
was not without its critics.\footnote{90} Because \textit{Hotchkiss} usurped established patent law, it would be sixteen years before the courts would accept the test of invention.\footnote{91}

Although the invention test enunciated in \textit{Hotchkiss} was constitutionally dubious,\footnote{92} the Court found the standard to be of such importance that it articulated a constitutional justification for it by the late 19\textsuperscript{th} century.\footnote{93} However, a struggle ensued to establish a standard of patentability that included the invention requirement.\footnote{94} It was not until 1966 with the

the knob were required in the application of it to the clay or porcelain knob than were possessed by an ordinary mechanic acquainted with the business, there was an absence of that degree of skill and ingenuity which constitute essential elements of every invention (emphasis added).

\footnote{90} The dissenting justice construing several cases, English and American that refuted the majority's reasoning, clearly articulates the usurpation in patent law, caused by this decision.\footnote{"[i]t is thus apparent to my mind that the test adopted below for the purpose to which it was applied, and which has just been sanctioned here, has not the countenance of precedent, either English or American; and, at the same time, it seems open to great looseness or uncertainty in practice." 52 U.S. (11 How.) at 270. See Burchfiel, \textit{Revising the "Original" Patent Clause}, 2 HARV. J.L. \\& TECH. 159 (1989) (the entire discussion of this article challenges the Court's adoption of this standard); Seidel, \textit{The Constitution and a Standard of Patentability}, 48 J. PAT. OFF. Soc'y, 5 (1966).}

\footnote{91} See Burchfiel, 2 HARV. J.L. \\& TECH. 155, 208 n.301 (1989) ("The first post-\textit{Hotchkiss} Supreme Court case to suggest that a patent was invalid on the basis that the difference between the invention and the prior art 'required no invention' and involved simply mechanical skill, which is not patentable." (describing Simpson v. Woodman 77 U.S. (10 Wall.) 117 (1869)).}

\footnote{92} See \textit{id.} at 167 (explaining that the Continental Congress specifically rejected Jefferson's proposal for higher levels of patentability beyond novelty and utility).

\footnote{93} See, e.g., Hollister v. Benedict Mfg., 113 U.S. 59, 73, 5 S.Ct. 717, 724 (1885) (the machine "is but a display of the expected skill of the calling, and . . . is in no sense the creative work of that . . . which it is the purpose of the Constitution and the patent laws to encourage and reward"); Thompson v. Boisselier, 114 U.S. 1, 11, 5 S.Ct. 1042, 1047 (1884) ("[i]t is not enough that a thing shall be new . . . and useful, but it must, under the Constitution and the statute, amount to an invention").

\footnote{94} See, e.g., \textit{Great Atlantic \\& Pacific Tea Co. v. Supermarket Equipment Co.}, 340 U.S. 147, 154, 71 S.Ct. 127, 131, (1950), \textit{reh'g denied} 340 U.S. 918 (1951) (in their concurrence, both Justice Douglas and Black opined that only patentable inventions were those which "serve the ends of science-to push back the frontiers of chemistry, physics, and the like . . . [whereby] masters of the scientific field in which it falls will recognize it as an advance"); \textit{Goodyear Tire \\& Rubber v. Ray-O-Vac Co.}, 321 U.S. 275, 279, 64 S.Ct. 593, 594 (1944) (the Court found a patent invalid because the invention was "simple and such as should have been obvious to those who worked in the field . . . ."); \textit{Exhibit Supply Co. v. Ace Patents Corp.}, 315 U.S. 126, 138, 62 S.Ct. 513, 519 (1941) (in their dissent, both Justice Black and Douglas asserted that the standard of invention is subjectively determined by the individual justice's views "[t]o call the device here an invention or discovery such as was contemplated by the Constitution or the statute is, in my judgment, to degrade the meaning of those terms"); \textit{Cuno Engineering Corp. v. Atlantic Devices Corp.}, 314 U.S. 84, 91, 62 S.Ct. 37, 41 (1941) (the Court, believing that an invention "must reveal [a] flash of creative genius and not merely the skill" expected of a mechanic in the art, found a patent for a cigarette lighter invalid); see also Burchfiel, \textit{Revising the "Original" Patent Clause}, 2 HARV. J.L. \\& TECH. 159, 168 (1989) (Before 1950 \"the constitutional theory proposed . . . was not expounded clearly.\")}
decision of *Graham v. John Deere Co.* that the Court clearly established a standard of patentability that incorporated the invention requirement.\textsuperscript{96}

Construing, for the first time, the new requirement espoused in section 103, of the 1952 Patent Act (1952 Act),\textsuperscript{97} the Court, in *Graham*, determined that it "codif[ied] the ... principle [asserted in] *Hotchkiss v. Greenwood*."\textsuperscript{98} Also, the Court expressly rejected arguments that the 1952 Act changed the standard of patentability.\textsuperscript{99} While the Court treated section 103 as a separate and distinct requirement, many commentators have found that section 103 was simply a further refinement of what constituted novelty under the Act.\textsuperscript{100} Thus, it is clear from both the legislative history of the 1952 Act and the *Graham* decision that an invention's patentability was never to be determined by the restrictive standard now applied by the
court to determine the patentability of claims containing algorithms. Rather, the standard of patentability the courts have traditionally required was that an invention merely demonstrate utility and novelty with novelty further defined by section 103.  

V. PARADOXES CAUSED BY THE RESTRICTIVE STANDARD

A. MISINTERPRETING GOTTSCHALK V. BENSON

1. Douglas' Cryptic Analysis

The author contends that the courts have consistently misinterpreted the holding of Gottschalk v. Benson and that Justice Douglas carefully crafted his opinion in order to maintain the statutory scheme for patent protection articulated in Graham while sustaining the efficiency of the patent office's examining procedures. Benson did not hold that algorithms were unpatentable per se. In fact, the issue addressed by the Benson court, whether algorithms were patentable processes, was not the issue answered. The gist of the Benson decision

101. See 383 U.S. 1, 18, 86 S.Ct. 684, 693, 148 U.S.P.Q. (BNA) 459, 466 (1966). The exact language of the court is as follows: The [1952] Act sets out the conditions of patentability in three sections. An analysis of the structure of these three sections indicates that patentability is dependent upon three explicit conditions: novelty and utility as articulated and defined in §101 and § 102, and nonobviousness, the new statutory formulation, as set out in § 103. The Court continues to state that "[w]e believe that strict observance of the requirements laid down here will result in that uniformity and definiteness which Congress called for in the 1952 Act." (emphasis added).

102. 409 U.S. at 71, 93 S. Ct. at 257, 175 U.S.P.Q. (BNA) at 676 ("It is said that the decision precludes a patent for any program servicing a computer. We do not so hold.").

103. Samuelson, Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions, 39 EMORY L.J. 1025, 1057 n.102 (1990) ("Nevertheless it is a curious fact... that the [Benson] Court did not directly answer its own question"); see In re Christensen, 478 F.2d 1392, 1395, 178 U.S.P.Q. 35, 38 (C.C.P.A. 1973) (in a concurring opinion, Justice Rich explained that the Court in Benson never decided whether the algorithm at issue was patentable subject matter); compare In re Freeman, 573 F.2d 1237, 1244, 197 U.S.P.Q. 464, 470 (C.C.P.A. 1978) ("[T]hat computer programs are not patentable was neither the holding nor the 'thrust' of Benson.").
was that the patent in that case was invalid because it did not satisfy the disclosure requirements embodied in section 112.104

The caveat with the patent in Benson was the claims failure to enable a person skilled in the art to make and use the claimed invention.105 In his decision, Justice Douglas first noted that the claims of the patent "weren't limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use."106 Justice Douglas continued to demonstrate the breadth of the claims by finding that they could be carried out with or without any machinery.107 He found "the 'process' claim [was] so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion."108 Finally, Justice Douglas held that the claims were too broad to be patentable because they "would wholly preempt the [algorithm]."109

Modern patent law has recognized that the enablement requirement of section 112 mandates that a patent specification teach those of ordinary skill in the art how to make and use the invention without undue experimentation.110 To further refine the rule, the Federal Circuit considers several factors in an undue experimentation analysis:

104. 35 U.S.C. §112. Under section 112, an patent specification must contain the following: "a written description of the invention, and of the manner and process of making and using it"; and the description must be "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 these terms shall set forth the best mode contemplated by the inventor of carrying out his invention (emphasis added).

105. The issue of proper written description requirement of an invention arises mostly where claims not present in an application when filed are present thereafter. Bender, Disclosure Requirements for Software-Related Patents, 8 THE COMPUTER LAWYER (P-H) No. 10 (Oct. 1991). An issue concerning best mode disclosure usually arises after the patent has issued and is not generally considered by the Patent Office during the prosecution of a patent. See id. Neither of these situations arose in the Benson case.

106. 409 U.S. at 63, 93 S. Ct. at 253, 175 U.S.P.Q. (BNA) at 674.

107. Id. at 67, S. Ct. at 255, 175 U.S.P.Q. (BNA) at 675 ("The mathematical procedures can be carried out in existing computers long in use, no new machinery being necessary. And, as noted, they can also be performed [mentally] without a computer.").

108. Id. 409 U.S. at 68, 93 S. Ct. at 255, 175 U.S.P.Q. (BNA) at 675.

109. See id. at 72, S. Ct. at 257, 175 U.S.P.Q. (BNA) at 676.

110. See, e.g., In re Wands, 858 F.2d 731, 736, 8 U.S.P.Q. (BNA) 2d 1400, 1404 (Fed. Cir. 1988).
(1) the quantity of experimentation necessary,
(2) the amount of direction or guidance presented,
(3) the presence or absence of working examples,
(4) the nature of the invention,
(5) the state of the prior art,
(6) the relative skill of those in the art,
(7) the predictability or unpredictability of the art, and
(8) the breadth of the claims.

The Federal Circuit has determined that these factors are illustrative. However, case precedent shows that overly broad claims within a patent application have often caused a court to find a patent invalid under section 112. From the foregoing discussion it becomes clear that Justice Douglas' analysis in Benson corresponds more to an issue involving section 112 rather than section 101. Thus, reliance on Benson as holding that algorithms are not patentable subject matter is dubious at best.

111. Id.
112. See, e.g., Amgen, Inc. v. Chugai Pharmaceutical Co. Ltd., 927 F.2d 1200, 1213, 18 U.S.P.Q. (BNA) 2d 1016, 1027 (Fed. Cir. 1991) ("[I]t is not necessary that a court review all the Wands factors to find a disclosure enabling.").
113. See, e.g., Dolbear v. American Bell Tel., 126 U.S. 1, 154, 8 S. Ct. 778, (1888) (distinguishing this case from Morse, the Court here found the patent valid because it was not for the use of electricity in its natural state, but for using it in a specified condition); O'Reilly v. Morse, 56 U.S. (15 How.) 62, 118-119 (1853) (where the Court invalidated a process patent whereby the patentee sought to obtain the exclusive right to the process of transmitting intelligible characters, signs, or letters at a distance invalid because it was too broad and did not specify any specific machine that would enable a person skilled in the art to make or use the machine); Wyeth v. Stone, 30 F. Cas. 723,727 (1840 C.C.D. Mass.) (No. 18,107) (which clearly articulates the rule invalidating patents on claims so broad as to be abstract by finding invalid a patent issued for an ice cutting machine because it was for an abstract principle since "the patentee failed to describe the means used to cut the ice"); Amgen, Inc. v. Chugai Pharmaceutical Co. Ltd., 927 F.2d 1200, 1214, 18 U.S.P.Q. (BNA) 2d 1016, 1028 (Fed. Cir. 1991) (construing an appeal from a lower court's decision, the Federal Circuit found "no error in the court's conclusion that the generic DNA sequence claims are invalid under Section 112" because they were overly broad); In re Wands, 858 F.2d 731, 740, 8 U.S.P.Q. 2d (BNA) 1400, 1407 (Fed. Cir. 1988) (in her dissent, Justice Newman argued in favor of supporting the Patent Board's rejection of the patent on the grounds that it was overly broad within the meaning of section 112).
114. This would coincide with Congress' findings that natural phenomena were not subject to patent protection because they were thought not to be amenable to the written description requirement. See, Diamond v. Chakrabarty, 447 U.S. 303, 312, 100 S. Ct. 2204, 2208, 206 U.S.P.Q. (BNA) 193, 198 (1980) (An "obstacle to patent protection for plants was the fact that they were thought not amenable to the 'written description' requirement of the patent law." (construing H.R. 11372, 71st Cong., 2d Sess., 7 (1930))). Compare Brzuga, A Review of the Benson-Flook-Diehr
2. Protecting The Graham Analysis

Justice Douglas addressed another issue in the Benson decision: whether the PTO could effectively examine patent applications containing claims for algorithms. The Court quoted, at length, three paragraphs from the Report of the President's Commission on the Patent System. This report prompted reservations concerning the PTO's ability to cope administratively with computer related patent applications. The Commission's findings were as follows:

The Patent Office now cannot examine applications for [computer related technology] because of the lack of classification technique and the requisite search files. Even if these were available, reliable searches would not be feasible or economic because of the tremendous volume of prior art being generated. Without this search, the patenting of [computer related technology] would be tantamount to mere registration and the presumption of validity would be all but nonexistent (emphasis added).

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115. The paragraphs quoted were:

"Uncertainty now exists as to whether the statute permits a valid patent to be granted on programs. Indirect attempts to obtain patents . . . should not be permitted."

"The Patent Office now cannot examine applications for programs because of a lack of a classification technique . . . the patenting of programs would be tantamount to mere registration and the presumption of validity would be all but nonexistent."

"It is noted . . . that copyright protection for programs is presently available."

409 U.S. at 72, 93 S.Ct. at 257-258, 175 U.S.P.Q. (BNA) at 677 (quoting To Promote the Progress of . . . Useful Arts, Report of the President's Commission on the Patent System, 6 (1966)).

116. See id.

The Court impliedly accepted the Commission's findings when it deferred to legislative action for the resolution of whether computer algorithms should be patentable.118

The Commission's concern that patenting would become mere registration is understandable considering the 1793 Act was such a system and proved unworkable.119 The Supreme Court's resistance to patenting an invention for which no prior art could be examined is understandable considering the Court had just concluded 116 years of labor in articulating a workable test for determining patentable subject matter that focused upon analyzing prior art.120 Preserving the statutory scheme articulated in the Graham decision was a major consideration in the reasoning of the Benson decision. However, the problems raised by the Commission are no longer present today.

The Patent Trademark Office recently completed an automated patent search system as a part of an automation effort begun in 1980.121 They have taken steps to facilitate searching for prior art by reclassifying subclasses of computer-related technology so that people with computer related backgrounds can explore prior art more proficiently.122 Because the problems that were present when the Court rendered its Benson decision are no longer present, the Court should limit Benson to the facts of that case.

B. THE INFRINGEMENT DILEMMA.

The present failure of the Court to recognize proprietary rights in algorithms has caused lower courts to undermine many existing patents. This has become increasingly apparent in actions for infringement. Determining infringement is a two-step process: the court must ascertain the scope of the claim reciting the infringed device and determine if that claim encompasses the alleged infringing device, then it must determine if either literal infringement or infringement under the

118. See 409 U.S. at 73, 93 S.Ct. at 258, 175 U.S.P.Q. (BNA) at 676-677 ("It may be that the patent laws should be extended to cover these [algorithms], a policy matter to which we are not competent to speak . . . action by the Congress is needed.").
119. See supra notes 71-78 and accompanying text.
120. See supra notes 84-101 and accompanying text.
doctrine of equivalents is present. If the accused device does not infringe literally, it may still infringe under the Doctrine of Equivalents if it "work[s] in substantially the same way, and accomplish[es] substantially the same result . . . even though they differ in name, form, or shape."

Computer technology added a twist to patent protection because of the technology's logical equivalency. Gemignani provides the clearest example:

If a mechanical device were built to invert matrices, it would be patentable subject matter as a machine . . . [C]all it MIM (matrix inverting machine). If a program were written to invert matrices using the same algorithm employed in the design of the MIM, the program would convert a computer which it was running into a virtual MIM.

The result is that any inventor could subvert the mechanical MIM by simply writing a program containing the same algorithm.

Recently, a Federal District Court addressed an infringement issue similar to Gemignani's example in *Allen-Bradley Co. v. Autotech Corp.* Autotech sued Allen-Bradley for infringement of its process control computer. This case found that for the purposes of infringement, a program stored in a Read Only Memory (ROM), is different from that stored in a Random Access Memory (RAM). The court found no literal infringe-

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126. *See M. GEMIGNANI, COMPUTER LAW § 42:31 (1985).*
127. *See id.*
129. "A programmable controller is a type of computer system designed particularly for use in a factory environment to direct the function of other machines. For example, a programmable controller can be used to control presses, drills, lathes and direct the functions of robots in the manufacturing process. *Id.* at *1.
130. *See id.* at **2. The court described the difference between the two types of memories as follows:

The distinction between [ROM] and [RAM] The tasks performed by the programmable controllers are, of course, programmed into the machines. This program of instruction
ment because the accused device did not contain every element of the protected device, i.e., one device contained a RAM and the other contained a ROM.\textsuperscript{131} Furthermore, the court found no infringement under the doctrine of equivalents because one could not modify the program in the ROM of the patented device whereas the program in the RAM of the accused device was easily modified.\textsuperscript{132} In spite of the fact that both programs, in their respective memories, may be logically equivalent, the court failed to protect Autotech's device from infringement. As one commentator explained "[t]his case is either an object lesson in how to write a claim involving software-do not restrict a program to being executed in a ROM-or it is a failure by a court to understand" the logical equivalency of computer-technology.\textsuperscript{133} This decision is a quintessential example of the problems facing patent law until proprietary rights in algorithms are reorganized.

C. UNPREDICTABILITY IN THE PATENT TRADEMARK OFFICE

The present practices of the PTO are not consistent with its policies. The patent office asserts that they do not patent "mere computer programs or mathematical formulas."\textsuperscript{134} However, a survey taken from July 1, 1987 to December 31, 1987 discovered that the Patent Trademark Office had issued 1.65 software patents per week.\textsuperscript{135} Often these claims were

\[
\text{(designated by Allen-Bradley as the "user control program")}
\]

is stored in the memory of the programmable controller. in which this program can be stored, but for purposes of this motion only two are material. The [ROM] used in the Autotech patent is generally programmed a single time. When the instruction program is located in [ROM] the programmable controller . . . can only read the instructions from the memory; the user cannot easily write new instructions into the memory. . . . The key feature of read-only memory is its non-volatility: in the event of a power outage, the instruction program is not lost. The [RAM] contained in the Allen-Bradley invention, by contrast, allows the instruction program to be altered, edited or rewritten an unlimited amount of times at the discretion of the user. . . . The chief disadvantage of [RAM] is its volatility; i.e., the information that is stored in a [RAM] can be lost in the event of a power outage.

\textsuperscript{131} The court stated, "[b]ecause of the fundamental difference in the type of memory in which the instruction is stored and from which the instruction program is executed between [the accused patent and the protected one], there is no literal infringement." \textit{Id.} at *4.

\textsuperscript{132} \textit{Id.} at *5.


broad enough not only to cover the program code, but also to include the underlying algorithm. Further, the PTO has issued five patents for algorithms since 1987. One of the patents, the Karmarkar algorithm, is similar to one which the C.C.P.A. previously held unpatentable. Often, when the patent office had issued a patent for an algorithm, it was given under the deceptive description of a Computer and a Method. However, in light of recent decisions concerning infringement, the protection expected for these patents is minimal at best.

The author believes that the combined effect of the infringement actions and the practices of the PTO will seriously undermine the integrity of the patent system. Although one is given exclusive rights in a patent, registering an invention with the PTO ensures that sufficient information will be available so that those who wish to develop the algorithm can do so. However, the courts have clearly shown that they will not recognize a proprietary right in an algorithm. It will not be long before inventors realize that there exists little incentive to bring forth, to the PTO, useful inventions when the court will fail to uphold the patents.

VI. A SUPERIOR STANDARD OF PATENTABILITY: HUMAN INGENUITY

A. LAWS OF NATURE AND NATURAL PHENOMENON

The problems arising from the current policy toward patenting algorithms demonstrate a need for fundamental change in

136. Id..
137. Samuelson, Benson Revisited: The Case Against Patent Protection For Algorithms and Other Computer Program-Related Inventions, 39 EMORY L.J. 1025, 1100 (1989) (citing N.Y. Times, Feb. 15, 1989, at D1, col. 4.). The patents are the 1989 Duhamel patent for a method of performing discrete cosine transformation (4,797,847), the 1989 Eastman Kodak patent for a system incorporating an error tolerant compression algorithm (No. 4,797,729), the 1988 Karmarkar algorithm (No. 4,744,028), the 1988 TRW patent for squared radix discrete Fourier transform algorithm (No. 4,768,159), and the 1987 Bracewell fast fourier transform (No. 4,646,256). Id. at n.282.
138. See 1075 OFF. GAZ. PAT. OFFICE 2236 (1987) (Pat. No. 4,646,256, issued Feb. 24, 1987). This was the Bracewell Fourier Transform. This is a sophisticated signal processing algorithm that enables computer to process certain calculations at twice the speed regardless of the hardware.
139. See supra note 22.
140. See supra note 22.
141. 35 U.S.C. § 112 ("A [patent] specification shall contain a written description of the invention ... in such full, clear, concise, and exact terms as to enable any person skilled in the art to ... carry out [the] invention").
142. See generally supra notes 26-64 and accompanying text.
the Court's standard of patentability. The Court should abol­
ish its per se rule against patenting certain inventions, as it did
with biotechnology patents. Instead, it should focus on whether
there has been human intervention in the development of the
algorithm to determine its patentability.

The traditional rule that living organisms were not the
proper subject for patent protection derives from late Nineteenth
Century patent law. This rule was probably a misinterpreta­
tion of the rule derived from LeRoy v. Tatham, that "[p]henom­
ena of nature are not the proper subject for patent protection." In Tatham the patent at issue claimed novelty not in the mecha­
nical parts, which were previously known, but in the process of
manufacturing lead pipes with a combination of heat and pres­
sure. The Tatham court stated, "a principle, in the abstract, is a fundamental truth . . . and cannot be patented . . . ," but
the Court qualified that rule by stating that a law of nature may
be the proper subject of a patent if applied to a new and useful
result. Subsequent decisions attempted to develop a standard
to determine when a phenomena of nature was the proper sub­
ject of a patent. However, the Court never clearly defined a
standard, and the rule against patenting phenomena of nature
was applied indiscriminately.

143. See, Thorne, Relation of Patent Law to Natural Products, 6 J. PAT. OFF. SOCY
23, 24 (1923) ("Plants . . . even though very valuable uses may be discovered for them,
or that they may have been obtained by the aid of scientific management in their prop­
agation . . . are not discoveries which are subject to patentable protection." (constru­
ing Ex parte Latimer, 1889 DEC. COMM’R PAT. 123)).

144. 55 U.S. (14 How.) 156 (1853).

145. See, e.g., Diamond v. Diehr, 450 U.S. 175, 185, 101 S. Ct. 1048, 1056, 209
U.S.P.Q. (BNA) 1, 89 (1981); Parker v. Flook, 437 U.S. 584, 589, 98 S. Ct. 2522, 2525,
255, 175 U.S.P.Q. (BNA) 673, 675 (1972). All three of these cases cite Tatham as holding
that phenomena of nature are not the proper subject for patent protection.


147. Id. at 175. The Court explained that a process, embodying a law of nature,
"must be stated with such precision as to enable an ordinary mechanic to construct and
apply the necessary process." Thus, the principle would no longer be in the abstract.

148. Id. ("A patent will be good though the subject of the patent consists . . . of a
. . . law of nature if that principle is . . . applied to . . . a practical result and benefit not
previously attained." (quoting the English case of Househill v. Nielson, Webster’s
Patent Cases 683)). It is apparent from the Court interchanging the use of the phrase
"phenomena of nature" with the phrase "law of nature" and vice versa, that a law of
nature is a subset of the greater category of pohenomena of nature, i.e., a law of nature
is a phenomena of nature, but a phenomena of nature is not necessarily a law of nature.

149. In patents containing claims for apparatuses, the Court has found that "a
scientific truth, or the mathematical expression of it, is not a patentable invention,
but a novel and useful structure created with the aid of knowledge of scientific truth
may be." See Mackay Radio & Telegraph Co. v. Radio Corp. of America, 306 U.S. 86,
94, 59 S. Ct. 427, 431 (1939) (this case sustained the validity of a patent that granted
the patent holder the exclusive right to manufacture antennas designed to the
This rule reached its zenith in Funk Brothers Seed Co. v. Kalo Inoculant Co.. Here, the Court reviewed a district court's invalidation of a patent for various bacteria of the genus Rhizobium. Although the Court found the product highly useful, Justice Douglas held that the invention was not patentable because the inventor created a compound that merely embodied the natural qualities of the bacteria.

B. THE HUMAN INGENUITY TEST

More recently, the Court has developed a test to determine whether an invention that embodies natural qualities may be the subject of a patent. For example, in Diamond v. Chakrabarty, a divided Court upheld a patent for a living microorganism into which the inventor had introduced multiple naturally occurring bacterial plasmids. The Court rejected the PTO's argument that living organisms are not patentable and held that a living, genetically altered, organism may qualify for patent protection as a new "manufacture" or "composition of matter" under section 101 of the Patent Act. Recognizing that the categories of patentable subject matter

specifications of a mathematical formula); see also, Funk Bros. Seed Co. v. Kalo Co., 333 U.S. 127, 68 S. Ct. 440, 441 (explaining that one may obtain a patent on a natural phenomenon only if it is one applies it to a new and useful end).

In patent applications containing process claims, the Court has found that phenomena of nature, used in a specified manner, will be the proper subject of a patent. See Dolbear v. American Bell Tel. Co., 126 U.S. 1, 533, 8 S.Ct. 778, 781 (1888) ("In the present case the claim is not for the use of a current of electricity in its natural state as it comes from the battery, but for putting a continuous current, in a closed circuit, into a certain specified condition, suited to the transmission of vocal and other sounds, and using it in that condition for that purpose." (emphasis added)).

151. Id. at 128-129, 68 S. Ct. at 440. These bacteria, when fixed to the roots of certain leguminous plants, enabled those plants to fix nitrogen from the air.
152. Id. at 131, 68 S. Ct. at 442. The Caveat was that out of the six Rhizobium species, no one species would be effective on the roots of all species of leguminous plants. The patentee discovered a certain mixture of these bacteria that would work on all leguminous plants without adverse side-effects.
153. Id. ("The combination of species produces no new bacteria, no change in the six species of bacteria, and no enlargement of the range of their utility ... The bacteria perform in their natural way ... They serve the ends nature originally provided and act quite independently of any effort of the patentee.")
154. See, Eisenberg, Patenting the Human Genome, 39 EMORY L.J. 721 (1990) ((Recent) "case law does not deny patent protection to all inventions composed of naturally occurring products or manifesting laws of nature. Instead, the cases suggest that the patentability of such inventions turns on whether the claimed invention is a new product or process resulting from human intervention ... ").
156. For an analysis of this invention, see infra notes 163-168 and accompanying text.
157. Id. at 311, 100 S. Ct. at 2208-2209, 206 U.S.P.Q. (BNA) at 198 (1980).
listed in section 101 were not exhaustive,\(^{158}\) the Court adopted a broad construction of the statute. In support of this broad construction, the Court quoted language from the Committee Reports accompanying the 1952 Patent Act to show that Congress intended statutory subject matter to "include anything under the sun that is made by man."\(^{159}\) As a result of Chakrabarty, the PTO uses human ingenuity as the touchstone for determining the patentability of claims reciting biotechnological inventions.\(^{160}\)

In Chakrabarty, Chief Justice Burger recognized two factors as determinative when finding human ingenuity present in an invention: the invention's utility, and its character.\(^{161}\) It is unlikely that the Court considered the utility of the invention as a controlling factor for finding human ingenuity because the Court had previously held that the most useful of natural elements are not the proper subject of a patent.\(^{162}\) Undoubtedly, the principal inquiry here was the character of the invention.

Examining Chakrabarty's invention, one finds that it consisted of a bacteria capable of degrading four main components of crude oil.\(^{163}\) While there were no known naturally occurring bacteria that could perform this task, there were four

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\(^{158}\) Id. at 316, 100 S. Ct. at 206 U.S.P.Q. (BNA) at ("Congress employed broad general language in drafting section 101 precisely because... inventions are often unforeseeable.").

\(^{159}\) Id. at 308, 100 S. Ct. at 2208-2209, 206 U.S.P.Q.(BNA) at 197 (1980) (The Committee Reports accompanying the 1952 Act inform us that Congress intended statutory subject matter to "include anything under the sun that is made by man.") S.Rep.No. 1979, 82d Cong., 2d Sess., 5 (1952); H.R.Rep.No.1923, 82d Cong., 2d Sess., 6 (1952) (footnote omitted).

\(^{160}\) See, Ex parte Allen, 2 U.S.P.Q. (BNA) 2d 1425, 1426 (1987) ("The issue, in our view, in determining whether the claimed subject matter is patentable under Section 101 is simply whether that subject matter is made by man"); Ex parte Hibberd, 227 U.S.P.Q. 443 (1985) (the Board of Patent Appeals held that non-naturally occurring, multicellular living plants were patentable subject matter under § 101).

\(^{161}\) Burger stated:

Here, by contrast, the patentee has produced a new bacterium with markedly different characteristics from any found in nature and one having the potential for significant utility. His discovery is not nature's handiwork, but his own...

447 U.S. at 310, 100 S. Ct. at 2208, 206 U.S.P.Q. (BNA) at 197.

\(^{162}\) See, Thorne, Relation of Patent Law to Natural Products, 6 J. PAT. OFF. SOC'Y 23, 24; Ex parte Latimer, 1889 DEC. COMM'R. PAT. 123, 127.

\(^{163}\) 1981 Chakrabarty Patent for Microorganisms Having Multiple Compatible Degradative Energy-Generating Plasmids (No.4,259,444); see also Application of Bergy, 596 F.2d 952, 968, 201 U.S.P.Q. (BNA) 352, 197 (C.C.P.A. 1979), aff'd, 447 U.S. 303 (1981) (the purpose of this new bacteria was destroy maritime oil slicks by dissolving components of the oil into substances that would serve as food for fish).
bacteria that could break-down any one of the components of the crude oil. From these four bacteria, Chakrabarty isolated the plasmid that enabled the bacteria to degrade the crude oil. These plasmids consist of double-stranded DNA (deoxyribonucleic acid) molecules: products of nature that are organized in a definitive complex structure. Chakrabarty's invention consisted of organizing the genetic sequence of the plasmids so as to make them compatible with both each other, and the bacteria that would act as the host cell for the plasmids. Although the invention consisted of a combination of naturally occurring elements, the Court recognized this combination of naturally occurring elements to form a useful invention for society as a product of ingenuity.

C. ALGORITHMS: A PRODUCT OF HUMAN INGENUITY

Given the Court's willingness to interpret section 101 broadly for biotechnology patents, the Court should extend this
reasoning to patent claims containing algorithms because they are also the product of human ingenuity. One can think of an algorithm as a combination of fundamental laws, i.e., addition, subtraction, multiplication, or as an expression of a fundamental law of nature, e.g., $E=mc^2$. However, once placed in a program, an algorithm must be expressed in structured sequence of operations. If this sequence is not properly constructed, the program will have no utility. Organizing an algorithm's sequence within a computer program requires human ingenuity, i.e., programming. Deriving utility from human ingenuity should be the touchstone for finding algorithms amenable to patent protection. This approach has long been the standard espoused by the Supreme Court for determining whether a law of nature is the proper subject of a patent.

For example, one could easily argue that a new nonobvious story expressed in a book is a patentable invention. Stories have a definite structure, e.g., a plot or a storyline. An author expresses sentences in a definitive structure to convey the story. Obviously, the contents of the story are far different than anything that exists in nature. However, it is commonly understood that a book is merely an expression of ideas and not a useful article. This is an overly simplistic view standard. Any reader who enjoys a book obviously finds it useful for enjoyment. Yet, it is not the type of utility that affords stories patent protection.

Examining algorithms, one easily finds that those algorithms recited in a word processing program are inherently useful when applied to a computer. This makes writing papers easier. Not all word processing programs are alike, e.g., some are both easier and have more functions to use than others making them more useful. The distinguishing characteristics between these programs is often the algorithms recited in them. Yet, as books, these algorithms are also expressions of ideas, and as such they are not patentable regardless of their utility. However, if these algorithms were tangible, there would be no question that they would be patentable.

Perhaps physicality is not the proper touchstone for distinguishing between that which is copyrightable from that which is patentable. Rather, it should be utility. The author suggests that in the future, the Supreme Court should focus on the requisite utility an invention must demonstrate in order to be amenable to patent protection.

169. See supra notes 9-18 and accompanying text. Many scholars and practitioners alike argue that both algorithms and programs should be afforded only copyright protection because they are merely expressions of ideas. However, this is not the case. Utility should be the distinguishing characteristic for differentiating between a product that is copyrightable from one that is patentable. This Court could solve this apparent problem if it would merely define the requisite utility required for an invention to be amenable to patent protection.

170. See, e.g., Diamond v. Diehr, 450 U.S. 175, 187, 101 S. Ct. 1048, 1057, 209 U.S.P.Q. (BNA) 1, 8 (1981) ("an application of a law of nature or a mathematical formula to a known structure or process may well be deserving of patent protection"); Funk Bros. Seed Co. v. Kalo Co. 333 U.S. 127, 130, 68 S. Ct. 440, 441 (1948) ("[i]f there is to be invention for [a] discovery [of nature], it must come from the application of the law of nature to a new and useful end"); Mackay Co. v. Radio Corp., 306 U.S. 86, 94, 59 S. Ct. 427, 431 (1939) ("While a scientific truth, or a mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be"); Leroy v. Tatham, 55 U.S. (14 How.) 156, 175 (1853) ("A patent will be good though the subject of the patent consists ... of ... law of nature if that principle is ... applied to ... a practical result and benefit not previously attained." (quoting the English case of Househill v. Nielson, Webster's Patent Cases 683)).
Furthermore, Chakrabarty's focus on human ingenuity for determining whether an invention is the proper subject of a patent is wholly consistent with the statutory scheme for patent protection espoused in Graham. The Graham court interpreted the new condition of patentable novelty contained in the 1952 Act as embodying the standard set forth in Hotchkiss.\(^\text{171}\) This standard focused on human ingenuity.\(^\text{172}\) Thus, both Graham and Chakrabarty support the same principle that the proper inquiry is on the extent of human ingenuity involved in the inventive process when determining patentable subject matter.

VII. CONCLUSION

The Court's restrictive standard of patentability has caused considerable problems in the patent system concerning claims containing algorithms. Because the Diehr Court was wrong in interpreting the categories of patentable subject matter in section 101 as a separate and distinct requirement apart from the test of invention articulated in section 102-103, the Court should abolish its current approach of categorically precluding certain inventions from patent protection. This approach must give way, as it did in biotechnology patent law, to a more predictable standard of patentability: a focus on human ingenuity. This standard of review is more amenable to case precedent and a less arbitrary standard of patentability than that currently used in computer technology patent law. Finally, this standard would assist the United States patent system in affording patent protection to those inventions most amenable to it: unforeseen technologies.

*Kenneth C. Brooks*

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\(^{171}\) See supra notes 95-99 and accompanying text.

\(^{172}\) See Burchfiel, Revising the "Original" Patent Clause, 2 HARV. J.L. & TECH., 155, 167 (1989) Burchfiel explains that the essential inquiry to determine patentable novelty is whether the skill required to make the changes in an invention exceed the ordinary skill in the art. This skill required in nothing less than human intervention.

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