Volume 6, Spring Issue, 1993

STALKING THE ELUSIVE PATENTABLE SOFTWARE: ARE THERE STILL *DIEHR* OR WAS IT JUST A *FLOOK*?

*Jur Strobos**

INTRODUCTION

A review of patentability of computer software is timely in order to describe the state of the art ten years after the creation of the U.S. Court of Appeals for the Federal Circuit. Further, the addition of five new judges during the last four years and the retirement of a significant unifying and steadying force in Chief Judge Markey presage changes in the review of all patent cases. Finally, the passage of time permits the application of perspective to the three seminal software cases decided by the Supreme Court in a decade that ended ten years ago.

This Article addresses whether inventions embodied in software are susceptible to patent protection. The statutory language describing patentable subject matter is broad:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.[1]

Software has been treated, even when in machine or apparatus form, as a new process.[2] The statutory language defining a process is similarly

---

* Director, Policy Research Staff, United States Food and Drug Administration. B.A., 1974, Johns Hopkins University; M.D., 1978, University of Chicago; J.D., 1987, University of Pennsylvania. The views expressed in this Article are those of the author and not those of the U.S. Government.

1. 35 U.S.C. § 101 (1988).

2. *See* Dann v. Johnston, 425 U.S. 219, 225 (1976) (indicating that Gottschalk v. Benson, 409 U.S. 63 (1972), did not turn on distinction between apparatus and process claims); Parker v. Flook, 437 U.S. 584, 593 (1978) (implementating a process does not convert process of thought into patentable subject matter); *In re* Meyer, 688 F.2d 789, 795 n.3 (C.C.P.A. 1982) (For purposes of § 101, "means for" apparatus claims "are not treated differently from method claims."); *In re* Pardo, 684 F.2d 912, 916 n.6 (C.C.P.A. 1982) (Apparatus "claims are treated as indistinguishable from the method claims for purposes of section 101 . . . ."); *In re* Walter, 618 F.2d 758, 768 (C.C.P.A. 1980) (method and apparatus claims deemed indistinguishable by the U.S. Patent and Trademark Office, with

broad:

> The term "process" means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.[3]

Congress has indicated, as pointed out by the Supreme Court, that the scope of these provisions is intentionally broad. The provisions are allegedly designed to "include anything under the sun that is made by man."[4] The only possible additional limitation on processes made by man is in the Constitution itself, which states that "[t]he Congress shall have the Power . . . 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."[5] This Article seeks to identify when software promotes useful arts and to describe a method of protecting such useful inventions.

To get to that point, however, this Article will first address whether the current standard for software patentability has met the statutory and constitutional mandate. This Article provides both a substantive description of past and current case law as well as an attempt to tease out the theoretical and logical underpinnings for the decisions of the various reviewing courts.

In retrospect, the Supreme Court cases say far less about software patentability in general, and more about the specific claims confronted, than both the bar[6] and the Court of Customs and Patent Appeals ("CCPA") may have appreciated at the time. The opinions of the Supreme Court are consistent with a much broader view of software subject matter patentability than has been implemented by the Federal Circuit. The Supreme Court was concerned that the breadth of asserted

---

which the U.S. Court of Customs and Patent Appeals agreed); *see also* Lee E. Barrett, *Report on Patentable Subject Matter: Mathematical Algorithms and Computer Programs*, *reprinted in* 38 Pat. Trademark & Copyright J. (BNA) No. 948, at 563, 566 (Sept. 21, 1989) ("Form of the claim does not control.").

3. 35 U.S.C. § 100(b) (1988).

4. Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980) (quoting S. REP. NO. 1979, 82d Cong., 2d Sess. 5 (1952); H.R. REP. NO. 1923, 82d Cong., 2d Sess. 6 (1952)).

5. U.S. CONST. art. I, § 8.

6. Richard H. Stern, *Tales from the Algorithm War:* Benson *to* Iwahashi, *It's Deja Vu All Over Again*, 18 A.I.P.L.A. Q.J. 371 (1991); David K. Friedland, *Computer Software Patentability: The Dilemma of Defining an Algorithm*, 2 SOFTWARE L.J. 537 (1988); Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959 (1986).

claims encompassed human computational skills or the use of hand, pencil, and head.[7] Fundamentally, such "preemption" is at the heart of its § 101 patentability determinations.[8]

This Article contends that the Supreme Court, through the years, has not altered its view of software patentability. However, the claim construction used by the Court has been misunderstood, and the impact of these opinions has been far-reaching.[9] The response to these opinions resulted in the creation of a substantive analysis of software patentability that precludes evaluation of the specifics of the software invention itself and focuses instead on physical steps and the environment in which the software is placed. Further, the opinions reinforced the suspicion of the U.S. Patent and Trademark Office and its Boards ("PTO") concerning software patentability in general.[10] This suspicion was originally borne of resource limitations.[11]

The second function of this Article is to describe the current inquiry used to assess software patentability under 35 U.S.C. § 101. That

---

7. *See* Gregory J. Wrenn, Comment, *Federal Intellectual Property Protection for Computer Software, Audiovisua. Look and Feel: The Lanham, Copyright, and Patent Acts*, 4 HIGH TECH. L.J. 279, 303-04 (1989) ("It would appear that, for all intents and purposes, the mental steps doctrine has not been squarely before the Supreme Court since the doctrine was repudiated by the C.C.P.A. in the later 1960's and early 1970's."). This Article posits that the *Benson-Flook-Diehr* trilogy (especially the preemption requirement) cannot be understood outside the context of mental steps and business transaction patentability.

8. Bruzga raises the interesting theoretical construct that the same result can be achieved by analogizing the preemption inquiry to traditional "overbreadth" patent law. Charles E. Bruzga, *A Review of the* Benson-Flook-Diehr *Trilogy: Can the "Subject Matter" Validity of Patent Claims Reciting Mathematical Formulae Be Determined Under 35 U.S.C. Section 112?*, 69 J. PAT. & TRADEMARK OFF. SOC'Y 197 (1987). He states that "each of the trilogy of cases [*Benson-Flook-Diehr*] addresses claim overbreadth concerns and reaches a result consonant with the claim overbreadth analysis undertaken. It is further observed that various important aspects of the cases may be more fully understood in light of the overbreadth doctrine." *Id.* at 200. This reviewer agrees. However, there is a distinction between "overbreadth" and "preemption." Preemption looks to possible human activity, including past activity, that may fall within the scope of the claim. In contrast, overbreadth looks to whether the claim covers some future technology that has not been enabled by the claims. *See* O'Reilly v. Morse, 56 U.S. (15 How.) 62 (1854) (Morse attempting to claim future uses of electromagnetism at a distance not enabled by his own work).

9. There is a predilection, based upon the historic rule that claim construction is a matter of law, for readers proficient in patent law to construe claims without benefit of the Supreme Court's express statements about their scope. This Article contends that, given the stated scope of the claims as held by the Court, the results in each of the Supreme Court's cases were mandated by long-standing precedent.

10. Hereinafter, the abbreviation "PTO" is used to signify both the discretionary ministerial functions of the administrative agency and the quasi-judicial actions of the various Boards of Patent Appeals and Interferences (previously, Board of Appeals).

11. *See generally* PRESIDENT'S COMM'N ON THE PATENT SYS., "TO PROMOTE THE PROGRESS OF . . . USEFUL ARTS" IN AN AGE OF EXPLODING TECHNOLOGY (1966).

inquiry focuses on the physical environment and the non-mathematical components in relation to the total claimed invention. The inquiry does not address the patentable aspects of the software itself, but instead how the software interacts with the physical world. Such an analysis does not promote and protect the creativity and invention peculiar to the difficult art of programming. However, this approach may recently have lost its momentum, and the time is therefore ripe to readdress the Supreme Court cases.[12] This Article analyzes the origin of the "physical steps" requirement and suggests that it relies on a view of the Supreme Court cases that is neither necessary nor legally sound. It is, however, the current law.

Finally, this Article proposes a different approach to evaluating patentability of software that is based on a close reading of Supreme Court jurisprudence, the various opinions of Judge Giles S. Rich over the last twenty years, and, in particular, on a scientifically sound paradigm for software. In this normative approach, primary emphasis is given to the representation in the claims, explicitly or implicitly, of the uniquely novel aspects of software relating to execution speed, automaticity and instantaneous repetition, the ability to shrink storage volume, accuracy in mathematic computation, and convenience. The adoption of such a paradigm will permit further growth toward an even better software paradigm that truly promotes the progress of the useful arts. This normative approach is founded in the holdings of the Supreme Court.

In summary, this Article examines existing paradigms of software function as an aid to understanding the case law. The case law analysis in turn begins with the origins of the logic underlying the legal treatment of software in the mental steps and business transaction cases. Next, the Supreme Court trilogy of patent software cases (the *Benson-Flook-Diehr* trilogy)[13] is reviewed. The early cases of the CCPA are discussed in the context of the evolving *Freeman-Walter* test.[14] The development of the physical steps requirement out of *Freeman-Walter* is then elucidated as explained in the *Abele*,[15] *Meyer*,[16] and *Grams*[17] cases. Finally, an

---

12. *See* Arrhythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053, 1061-66 (Fed. Cir. 1992) (Rader, J., concurring).

13. Gottschalk v. Benson, 409 U.S. 63 (1972); Parker v. Flook, 437 U.S. 584 (1978); Diamond v. Diehr, 450 U.S. 175 (1981).

14. *In re* Freeman, 573 F.2d 1237 (C.C.P.A. 1978); *In re* Walter, 618 F.2d 758 (C.C.P.A. 1980).

15. *In re* Abele, 684 F.2d 902 (C.C.P.A. 1982).

16. *In re* Meyer, 688 F.2d 789 (C.C.P.A. 1982).

17. *In re* Grams, 888 F.2d 835 (Fed. Cir. 1989).

alternative view of software is proposed and derived from the opinions of Judges Rich (*Bergy*,[18] *Walter*,[19] and *Iwahashi*[20]) and Rader (*Arrhythmia*[21]).

I. PARADIGMS, MENTAL STEPS, AND BUSINESS TRANSACTIONS

A. Computer Software Paradigms

When dealing with novel issues or facts, the law, the courts, and lawyers are apt to evaluate the circumstances by analogy.[22] The paradigms, and their underlying assumptions, will determine the results of legal contests.[23] However, if the paradigms are inaccurate, the law and structural categories developed will not deal satisfactorily with the new questions.[24] Any consideration of recently evolved legal tests for the protection of innovative software must first explore the paradigms of computer software function. The paradigms can then be compared to the actual capabilities and functions of software to determine the paradigms' accuracy.

The principal paradigm is currently a physical incarnation of mental steps or business transactions.[25] There are two versions. The first is the "mathematical algorithm" version, which means that the software directs a computer to perform primary and essential mathematical functions, like adding, multiplying, tabulating, simultaneously solving multiple sequential equations for a single unknown variable, or solving differential equa-

---

18. *In re* Bergy, 596 F.2d 952 (C.C.P.A. 1979), *aff'd sub. nom.* Diamond v. Chakrabarty, 447 U.S. 303 (1980).

19. *In re* Walter, 618 F.2d 758 (C.C.P.A. 1980).

20. *In re* Iwahashi, 888 F.2d 1370 (Fed. Cir. 1989).

21. Arrhythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053, 1061-66 (Fed. Cir. 1992) (Rader, J., concurring).

22. *See, e.g.*, Parker v. Flook, 437 U.S. 584, 595 (1978) ("To a large extent our conclusion is based on reasoning derived from opinions written before the modern business of developing programs for computers was conceived."); *Walter*, 618 F.2d at 765 ("There exists a wealth of precedent, most of it predating the advent of computer technology, which aids in addressing the problem, which, as we have noted, is one of mathematics, not of computers.").

23. *Cf.* ROGER FISHER & WILLIAM URY, GETTING TO YES (1981) (identification of underlying perceptions, interests, and criteria are a predicate to discussion).

24. *See, e.g.*, Robert W. Wild, *Computer Program Protection: The Need to Legislate a Solution*, 54 CORNELL L. REV. 586, 604-09 (1969).

25. The case law on business transactions is discussed in depth in this Article. *See infra* notes 29 & 101 (case law on "mental steps"). The focus in the business transactions cases is based on their factual accessibility.

tions.[26] This version of the paradigm includes software use of equations or formulae that express physical relationships, scientific truths, laws of nature, or describe chemical reactions in mathematical terms. The first version, then, is that software does no more than organize data and automate standard systems of management or mathematical solutions.[27] Under this mathematics paradigm, patent protection for software would permit preemption of mental steps by the non-inventive act of writing down the steps in computer-readable code.[28] The close relation of this paradigm to the "mental steps" doctrine is apparent.[29] The earliest functional computers, with hard-wired programs, most resemble this paradigm. When the computer or software performs steps that are historically well-known business, financial, or accounting steps, the paradigm encompasses "business transactions" patent law exclusions as

---

26. As stated in *In re* Christensen, 478 F.2d 1392, 1394 (C.C.P.A. 1973), "[t]he *Benson* application claims, [409 U.S. at 73-74,] which the Supreme Court held do not constitute a patentable process within the meaning of 35 U.S.C. § 100(b), recite a method of converting signals or representations from binary coded decimal form into binary form by a series of steps. The steps include shifting, masking, adding, and repeating."

27. *See* Stern, *supra* note 6, at 392 ("doing by aid of a computer a function that was previously done in a laborious way or was not done at all because it was infeasible without a computer").

28. *See* Wrenn, *supra* note 7, at 301 ("One might analogize the steps executed in a computer program to a 'thought process' that could be performed mentally by a human.").

29. The PTO, and patent case law, have had a long history of precluding patentability under the "mental steps" doctrine. While the continuing vitality of the mental steps doctrine may be in doubt, nonetheless, the paradigm underlying its previous existence continues to operate. *See* Jeffrey A. Simenauer, Note, *Patentability of Computer-Related Inventions: A Criticism of the PTO's View on Algorithms*, 54 GEO. WASH. L. REV. 871, 887 (1984) ("The mental steps doctrine was also an obstacle to the patentability of computer programs."); *see, e.g.*, Examination of Patent Applications on Computer Programs, 33 Fed. Reg. 15,609 (1968) (PTO guidelines on nonpatentability of computer programs), *rescinded by* 34 Fed. Reg. 15,724 (1969); Rubber-Tip Pencil Co. v. Howard, 87 U.S. (20 Wall.) 498, 507 (1874) ("An idea of itself is not patentable."); *In re* Bolongaro, 62 F.2d 1059, 1060 (C.C.P.A. 1933) ("This result [improved method of printing] is doubtless more accurate than the methods which have heretofore been used by printers and publishers to accomplish similar results, but it is not a new method and, to our mind, is not inventive. It more nearly approaches that line of cases in which the subject-matter has been held not patentable, and which has been referred to as including 'a method of transacting business, a form of contract, a mode of procedure, a rule of conduct, a principle or idea, or a permissive function predicated upon a thing involving no structural law.'" (quoting counsel's argument from Cincinnati Traction Co. v. Pope, 210 F. 443, 446 (6th Cir. 1913))); *In re* Cooper, 134 F.2d 630, 632 (C.C.P.A. 1943); *In re* Heritage, 150 F.2d 554, 556-58 (C.C.P.A. 1945) ("Such purely mental acts are not proper subject matter for protection under the patent statutes, as held by the tribunals of the Patent Office."); *In re* Abrams, 188 F.2d 165, 168-70 (C.C.P.A. 1951) ("It is self-evident that thought is not patentable."); *In re* Shao Wen Yuan, 188 F.2d 377, 380-83 (C.C.P.A. 1951); *In re* Lundberg, 197 F.2d 336, 339 (C.C.P.A. 1952); *In re* Venner, 262 F.2d 91, 95 (C.C.P.A. 1958). *But see In re* Prater, 415 F.2d 1378 (C.C.P.A. 1968), *modified*, 415 F.2d 1393 (C.C.P.A. 1969), *questioned in*, Diamond v. Diehr, 450 U.S. 175, 199 n.14 (1981) (Stevens, J., dissenting).

well.

A simple corollary to the "mathematical algorithm" model is the "physical intervention" model, which concerns the automation of a manual activity by a software-driven computer. However, only an analysis of the scope of the patent claim will elucidate whether the proposed patent protection extends to existing human activities, or is limited to a computerized manifestation. The entirety of the claim must be scrutinized to assure that the act of calculating is itself not claimed. To that end, automation of many historic business transactions, business operations, mathematics, paper management, or simple controls for machines could permissibly be protected so long as the claim scope is limited to the added value of the software plus the environment.[30] The abacus and manual adding machine are examples of protectable inventions within the mathematics version of the paradigm.

The second version of the paradigm is the "electronic library" model. In this version, the computer is the electronic equivalent of a lending library with the addition of physically smaller storage space and portability. The computer is a replacement for existing information storage technology or communications media, such as books, newsletters, and wire services.[31] The computer adapts the possibilities inherent in electronic storage to known and well-used information storage and communication structures. In this other version of the paradigm, the computer software also adds little value, and poor claim drafting has the potential for preempting existing technology. Possibly preempted library functions include data collation, organization, compilation, editing, and publishing.[32] Again, permissibly protected are claims limited to a specific physical environment or structure that places the new function in a particular context. The Dewey Classification System is an example within the library version of the paradigm where patentability is limited to a specific physical manifestation.

There is another paradigm, however, that would permit greater attention to the functional details of computer software and the real novelty involved in software. A realistic paradigm is that, while

---

30. This is the approach taken in the *Abele* test, *infra* Section IV.

31. *See In re* Bradley, 600 F.2d 807, 812 (C.C.P.A. 1979) ("On the other hand, it may be that the data and the manipulations performed thereon by the computer, when viewed on the human level, represent the contents of a page of the Milwaukee telephone directory, or the text of a court opinion retrieved by a computerized law service."), *aff'd mem. sub. nom.* Diamond v. Bradley, 450 U.S. 381 (1981).

32. *See, e.g., In re* Freeman, 573 F.2d 1237 (C.C.P.A. 1978).

"computerization" may duplicate existing inventions, it adds speed and automaticity to the useful arts.[33] Under this paradigm, software performs faster than human processing, although it may employ the same steps. Further, the paradigm asserts additive value in automating well known and previously used calculations, organizations of data, or data evaluation. The key added value concepts in the library version are increased volume and enhanced access. Finally, once the software has been proven, the program also adds reliability and accuracy.

For software to provide more than a replacement of existing technology, including the use of paper and pencil, something more is required in the claim, whether it is contextual environmental steps or added power. *Added* value becomes the key to subject matter patentability. The mathematics or library paradigm does not look at the means of accomplishment, but only at *what* is accomplished. The other paradigm searches for added value in the properties of *speed, volume, accuracy, convenience,* or *automaticity*, which change the character of the software from duplicative to novel. With carefully drawn claims, under either paradigm, there can be no preemption of known human processes and functions. The opinions of the Supreme Court dealing with software focus on the presence or absence of unique software features within the scope of the claimed invention, whereas the majority view of the CCPA and Federal Circuit require contextual physical steps.

Both paradigms, however, may have lost relevance, especially as software programming takes on more of the features of scientific artistry and the simple early programs are improved. First, the addition of automaticity, accuracy, and speed, permits functions that were not conceivable before this technology. Examples abound in artificial intelligence systems that process differently from human systems.[34] To that end, a claim for an invention directed to such a completely novel function should not require reference to speed, automaticity, or environment to be distinct from human thought. With regard to the future of

---

33. *See, e.g., In re* Walter, 618 F.2d 758, 764 (C.C.P.A. 1980) ("A computer is nothing more than an electronic machine. It is characterized by its ability to process data, usually by executing mathematical operations on the data at high speeds. By virtue of the speed with which computers operate, they are capable of executing complex or otherwise time-consuming calculations in fractions of a second.").

34. *See* Serdar Uckun, *Model-Based Reasoning in Biomedicine*, 19 CRITICAL REVIEWS IN BIOMEDICAL ENGINEERING 261 (1992) (using biologic-systems predicting software that learns and then adds to causal reasoning used by physicians); *see also* OFFICE OF TECH. ASSESSMENT, COMPUTER SOFTWARE AND INTELLECTUAL PROPERTY 2 (1990) (discussing neural networks which are trained rather than programmed).

software patentability, then, a merger of the context and added value views may be possible.

However, the case law continues to assess whether granting monopoly protection to computer algorithms risks the possibility of removing from the public domain access to existing ideas, abstractions, higher mathematics, and systems of information organization that are now performed by human beings. This inquiry is performed by requiring an environmental context. Claims that include basic scientific truths or mathematic solutions must first be scrutinized for context or preemption of human functions.[35]

Whether this inquiry will continue to prevail depends on the continuing vitality of the paradigms. The paradigms themselves, by negative implication, raise the question of whether software does, in fact, duplicate human mental functions. To the extent that the view of the human brain as a sophisticated analog computer is inaccurate, patentability determinations under § 101 will be made in error. When software performs functions or provides information that could never be duplicated by man, the paradigm fails. To that end, the Federal Circuit may be coming to a view that questions the context requirement. If this examination evolves, and as the art of software advances, patentability determinations are likely to increase. A continuing force in the opposite direction, however, has been the historic reluctance of the PTO to support patentability of software, largely based on human resource, library, and capital appropriations limitations.[36]

---

35. As recently stated by a senior patent examiner at the PTO:

> [T]here is a peculiar danger in patenting computer programs, in particular when claimed as a "computer-implemented process" or the equivalent (claim draftsmanship) "computer apparatus." The danger is in the ease of pre-empting well-known methods, and abstract inventions, such as the Dewey Classification System for libraries, or bookkeeping methods, or translating words using a dictionary, and so on, merely by writing a computer program in equivalent English, and claiming the standard elements of the commonplace computer.

E.S. Matt Kemeny, *Computers and Non-Patentable Matter: Rejections under Article I of the Constitution*, 74 J. PAT. & TRADEMARK OFF. SOC'Y 669, 672 (1992).

36. *See* PRESIDENT'S COMM'N, *supra* note 11, at 13 (citing the administrative burden of permitting software patent protection and the likelihood that issued patents would be readily challenged because of the PTO's inability to assess prior art as justification for refusing patentability for software); Examination of Patent Applications on Computer Programs, 33 Fed. Reg. 15,609 (1968), *rescinded by* 34 Fed. Reg. 15,724 (1969); *see also In re* Prater, 415 F.2d 1393, 1399-1400 (C.C.P.A. 1969); Simenauer, *supra* note 29, at 885 (administrative inconvenience). Recent commentary suggests this recalcitrance will be institutional-

One of the origins of the paradigms governing patentability is in early attempts to obtain patent protection for inventions that purported to merge transactional processes with physical manifestations. Cases about the patentability of physical documents are an appropriate starting point from which to examine the origin of concerns about preemption of human activity and its relationship to patentability issues under § 101. These cases symbolize the first approaches taken to patenting the automation of human processes. Therefore, a review of these cases is appropriate as a basis for the later Supreme Court trilogy of *Benson-Flook-Diehr*, as well as the CCPA's formulation of the *Freeman-Walter* test, and its modification in *Abele*.

B. U.S. Credit: *Business Made Corporeal*

In *U.S. Credit*,[37] an insurer obtained a patent on a system, including forms that embodied the needed mental steps, for calculating the actuarial risk associated with bad debt for different industries. The result of the calculations was the amount of bad debt for which the insurer would be responsible. The cited claims referred to physical sheets and forms with columns and spaces as the means to accomplish the invention.[38] The court explained that the principal claimed features of the purported invention were the implementing forms which obviated the need for highly trained accountants or actuaries to receive or consider raw data.[39]

The Second Circuit affirmed the lower court's conclusion that the patent claims were invalid. Although briefing had focused on whether an individual could claim a method of transacting business, the Second Circuit simply noted that the writing down of the heretofore needed mental steps performed by each insurer was not patentably novel. Whether there was a prior physical embodiment of the transactional process was not relevant to the determination of the patentability of forms that embodied, and therefore claimed, that transaction. The court stated:

---

ized. *See* D. Lee Anton & Theodore A. Feitshans, *Is The United States Automating a Patent Registration System for Software? A Critical Review of Information Management in the U.S.P.T.O.*, 72 J. PAT. & TRADEMARK OFF. SOC'Y 894, 895-96 (1990) (contending that a policy of not issuing patents for software rests in "compensating for the inability of the PTO to compare patent applications involving computer software with the prior art," because the PTO has no library of prior art nor familiarity with current software practices).

37. U.S. Credit Sys. Co. v. American Credit Indem. Co., 59 F. 139 (2d Cir. 1893).

38. *Id.* at 142. The breadth of the claims was noted: "It is manifest . . . that what is claimed is not what is stated in the title and declaration of invention." *Id.*

39. *See id.* at 141.

> Given a series of transactions, there is no patentable novelty in recording them, where, as in this case, such record consists simply in setting down some of their details in an order or sequence common to each record. . . . The holder of this patent has not, by [describing the common transactions and the method of conducting of such business], secured any monopoly of the "transactions" to be recorded; and, such transactions having their origin and completion independent of this patent, there is not patentable novelty in the use of sheets for the purpose of recording them.[40]

In summary, then, the court held that there is no satisfaction of the statutory requirement for novelty merely by crafting a physical embodiment that permits automating what had heretofore been performed manually and mentally. If software is viewed as a similar novel physical embodiment, although recorded in code and read by a computer, the same general rule should nonetheless apply.

C. Cincinnati Traction: *Better Business Through Paper*

The patentee in *Cincinnati Traction*[41] devised a solution to the problem of permitting riders on street railways to transfer rapidly from one line to another by issuing a single form ticket for all rides taken during a period of time. The surmounted problem was distinguishing the paying customer, on the second entry, from riders who had yet to pay and providing a time limit within which transfers were permissible after single purchase. The physical embodiment of the solution was a dated transfer ticket receipt with two parts separated by perforations, for which the whole was good for afternoon transfers, and half for morning transfers. On appeal, after a holding of validity and infringement, the patent was assailed by opposing counsel as "relating merely to 'a method of transacting business, a form of contract, a mode of procedure, a rule of conduct, a principle or idea, or a permissive function, predicated upon a thing involving no structural law.'"[42]

The court upheld the patent. It reviewed similar cases and concluded

40. *Id.* at 143.
41. Cincinnati Traction Co. v. Pope, 210 F. 443 (6th Cir. 1913).
42. *Id.* at 446 (quoting statements of counsel).

that, first, "[t]he device of the patent clearly involves physical structure,"[43] and, second, the claims were limited to that structure, a particular physical embodiment of a system for assuring ticket security, and thus were patentable subject matter. The court also found that "[t]he fact that the structure may be of cardboard with printed matter upon it does not exclude the device from patentability."[44] Finally, after reviewing the language of the statute, the court concluded that "[n]or is there merely an attempt to patent a form of a contract. The specifications do not confine the construction to either the style, or printed arrangement or language of the legends. The essential thing is that the required information be conveyed on the face of the ticket."[45]

After disposing of the question of patentable subject matter, the court considered the novelty of the claimed ticket against the prior art. The court held the claims of the patent-in-suit distinguishable, stating:

> Conceding that there "could be no patentable novelty in a coupon ticket per se, nor in the mode of use involved in issuing a whole or a part only of a ticket," it is not the mode of use which is the subject of the patent, and the structural differences between the Pope device and the prior art are, in our opinion, matters of substance and not merely form.[46]

D. Summary

The principal unique questions in determining the patentability of physical embodiments which automate existing practices are the nature of the existing practices (which tend to be manual or mental), how they could be changed by the addition of factual knowledge or ideas alone, and the scope of the asserted claim. When the claimed invention captures existing business transactions, even inadvertently and whether already present in physical form or merely a common "mode of use," then the new process is not patentable.[47] The time-honored difficulty is identifying

---

43. *Id.*

44. *Id.* at 447 (quoting Benjamin Menu Card Co. v. Rand, McNally & Co., 210 F. 285, 286 (N.D. Ill. 1894)).

45. *Id.* at 446-47.

46. *Id.* at 448 (citation omitted).

47. *See In re* Sarker, 588 F.2d 1330, 1333 (C.C.P.A. 1978) ("Mathematical exercises, or methods of calculation, are within the myriad of mental processes of which the human

pre-existing practices. The solution to this quandary has been to presume that mental and manual practices can readily adjust to any new information, knowledge, or scientific truth, because ideas themselves are unprotectable. The inquiry then becomes the same as the one later suggested by the Supreme Court under § 101 for software: Do the claims cover "head and hand" processes imbued with the new ideas? If not, the subject matter is patentable. The line of demarcation between an overly broad claim to a process of thought and one narrowly limited to a specific embodiment is found in the distance between *U.S. Credit* and *Cincinnati Traction*.

Software patentability addresses whether the claims would serve to remove from the public domain something that is already available. The underlying question is whether the new process embodied in the software, as *claimed*, has truly and substantially brought something new to the marketplace, especially when previous practices did not have physical embodiments. The commercial functions of the human body and brain are the real prior art to computer software.

The questions with software are the same as those with business forms. First, what does the claim really say and is it limited to the new physical form? Second, does the alleged invention surreptitiously cover, or preempt, existing practices that may not have a physical embodiment? Third, is the claim directed to the added value that the new technology provides to the transaction or operation? Instead of responding in this hypothetical manner, however, the PTO's lack of knowledge about business transactions and common industrial practices has led to (1) review of software under the legal rubric of subject matter patentability, and (2) manifestations of the PTO's historic reluctance to examine software applications.

A final feature of the early cases that takes on added importance in reviewing current cases is the focus on the specific claims in the patent-in-suit. In *U.S. Credit*, the claims covered prior-art human actions. Thus, the patentee had attempted to claim ordinary human functions. In *Cincinnati Traction*, however, the claims were narrowly directed to the specific added value embodiment of perforated transit tickets.

---

mind is capable. Though they may be represented by written formulae, symbols, equations, or 'algorithms,' mathematical exercises remain disembodied. They may not, therefore, cross the threshold of § 101.").

II. THE BENSON-FLOOK-DIEHR TRILOGY

A. Gottschalk v. Benson

In *Benson*,[48] the Supreme Court first considered the patentability of computer software. The patent applicants' method claims were steps to be used to convert binary-coded numbers in base ten into pure binary form.[49] The claimed method contained no machine elements.[50] After the PTO rejected the application for lack of patentable subject matter, the applicants obtained successful review in the CCPA. The government sought *certiorari*.

The Supreme Court reinstated the rejection of the claims under § 101. The Court noted that the claims were the analytic steps themselves, and "not limited to any particular" embodiment.[51] The claimed novelty was that varying "the ordinary arithmetic steps a human would use by changing the order of the steps, changing the symbolism for writing the multiplier used in some steps, and by taking subtotals after each successive operation,"[52] was an advance over "doing arithmetic as a person would do it by head and hand."[53] However, the Court found that the steps could be carried out without the use of a computer.[54] The Court stated the general rule that "[p]henomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological

---

48. 409 U.S. 63 (1972).

49. *Id.* at 66-67, 73-74. Binary coded decimal numbers are a standard intermediate step in converting decimal numbers to base two binary numbers. *See* Friedland, *supra* note 6, at 549.

50. As stated by the Court, "[t]he claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use." 409 U.S. at 64. Claim eight, as construed by the Court, reads on a manual device used by high school teachers to demonstrate base two coding. In short, the Court construed the claim as covering the underlying mathematical formula for carrying out the decimal to binary calculation. *See* Stern, *supra* note 6, at 373-74 ("The method was intended principally for use in telephone switching systems, but the claims presented were not so limited."); Bruzga, *supra* note 8, at 205 ("For example, the claims in *Benson* could have been restricted by specifically reciting a 'general purpose digital computer,' and further could have specifically set forth the various portions of the digital computer that are used in performing the mathematical steps involved.").

51. 409 U.S. at 64.

52. *Id.* at 67.

53. *Id.* at 65.

54. *Id.*

work."[55] This rule is derived from cases expressing the mental steps doctrine, under which "purely mental acts are not proper subject matter for protection under the patent statutes."[56]

The Court held that the claims, as construed, were unpatentable because they were "so abstract and sweeping as to cover both known and unknown uses" with or without any apparatus.[57] The method claims were drawn to the mathematic conversion itself rather than a physical embodiment or a "transformation and reduction of an article 'to a different state or thing.'"[58] The Court concluded that the claims in question would have the "practical effect" of wholly preempting any use of the mathematical steps in the conversion formula.[59]

In *Benson* the Court expressly did not address the ultimate patentability of computer software. However, the use of language about the unpatentability of algorithms and mathematics led to the belief that the Court did in fact address software patentability. A computer program is nothing more than a series of mathematical steps conducted by a machine composed of electronic switches and storage sites. Such a series of mathematical steps is commonly defined as an algorithm.[60] Thus, if a sequence of algorithms could not be patentable, the conclusion would have to be that all computer software is unpatentable.[61] However, the

---

55. *Id.*

56. *In re* Heritage, 150 F.2d 554, 556 (C.C.P.A. 1945).

57. 409 U.S. at 68. See also the statement that "[t]hus, Abrams disclosed and claimed a process which could only be performed in the mind insofar as the teachings of the application were concerned." *In re* Prater, 415 F.2d 1393, 1402 (C.C.P.A. 1969) (referring to *In re* Abrams, 188 F.2d 165 (C.C.P.A. 1951)).

58. 409 U.S. at 70 (citing Cochrane v. Deener, 94 U.S. 780, 788 (1876)). As later noted by Judge Rich, "[s]een in this light, it is apparent that the claim [in *Benson*] would, in effect, dominate all practical and significant uses of the formula." *In re* Diehr, 602 F.2d 982, 986 (C.C.P.A. 1979), *aff'd mem. sub. nom.* Diamond v. Diehr 450 U.S. 175 (1981).

59. 409 U.S. at 71-72.

60. An algorithm is defined as a "[s]tep-by-step procedure for solving a problem or accomplishing some end." WEBSTER'S NINTH NEW COLLEGIATE DICTIONARY 70 (1990). The Supreme Court may have been using an older definition, under which algorithm is a corruption of the word algorism, which refers to "the art of calculating by means of nine figures and zero," or "the art of calculating with any species of notation," WEBSTER'S NEW INT'L DICTIONARY 52 (1981), which is a technically accurate description of the claimed process in *Benson*. If so, the *Benson* preclusion of claiming algorithms would be an extremely narrow holding.

61. Justice Stevens, later the author of Parker v. Flook, 437 U.S. 584 (1978), stated in dissent in Diamond v. Diehr, 450 U.S. 175, 219 (1981), his support for exactly this proposition: "I believe both concerns would be better addressed by (1) an unequivocal holding that no program-related invention is a patentable process under § 101 unless it makes a contribution to the art that is not dependent entirely on the utilization of a computer, and (2) an unequivocal explanation that the term 'algorithm' as used in this case, as in *Benson* and *Flook*, is synonymous with the term 'computer program.'"; *see also In re*

opinion does not eliminate patentability for any algorithm or series of algorithms. Rather, the case concerns specific claims which *duplicate* and, therefore, include functions that can readily be performed by head and hand. In *Benson*, Justice Douglas uses the terms "idea" and "mental processes" to imply that the legal rubric of § 101 (unpatentable subject matter) refers to a particular software claim. There may have been no actual use by a machine, other than the human brain, of the conversion steps claimed, but the claim covers activity that could be done by the human brain. Furthermore, one would not expect to find documentation of the use of specific mental steps by someone in the "prior art" which justifies using the rubric of § 101, rather than § 102. In sum, *Benson* restates the longstanding law of unpatentable subject matter that a software method claim that is not limited to a specific novel embodiment converts parallel human activity into infringement.[62]

Iwahashi, 888 F.2d 1370, 1374 (Fed. Cir. 1989) ("We note these discussions of the meaning of 'algorithm' to take the mystery out of the term and we point out once again that every step-by-step process, be it electronic or chemical or mechanical, involves an algorithm in the broad sense of the term."); *In re* Walter, 618 F.2d 758, 765 n.4 (C.C.P.A. 1980) ("[T]he general meaning of the word . . . connotes a step-by-step procedure to arrive at a given result. . . . Such a proposition, if accepted, would have the effect of totally reading the word 'process' out of § 101, since any process is a step-by-step procedure to arrive at a given result."); *In re* Freeman, 573 F.2d 1237, 1245 (C.C.P.A. 1978) ("Though the board gave no clear reasons for so concluding, its approach would appear to be that every implementation with a programmed computer equals 'algorithm' in the *Benson* sense. If that rubric be law, every claimed method that can be so implemented would equal nonstatutory subject matter under 35 U.S.C. § 101."); *In re* Chatfield, 545 F.2d 152, 156 n.5 (C.C.P.A. 1976), *cert. denied*, 434 U.S. 875 (1977) ("[I]t is axiomatic that inventive minds seek and develop solutions to problems and step-by-step solutions often attain the status of patentable invention. It would be unnecessarily detrimental to our patent system to deny inventors patent protection on the *sole* ground that their contribution could be broadly termed an 'algorithm.'"); *In re* Christensen, 478 F.2d 1392, 1396 (C.C.P.A. 1973) (Rich, J., concurring) ("'Algorithm' has been used in the sense of a 'procedure for solving a given type of mathematical problem' and 'formula' is used in the sense of a mathematical formula. The Supreme Court in *Benson* appears to have held that claims drafted in such terms are not patentable—for what reason remaining a mystery."); Friedland, *supra* note 6, at 539 ("algorithm is the concept which confuses courts the most"). *But see* Diamond v. Diehr, 450 U.S. 175, 186 n.9 (1981) ("[O]ur previous decisions regarding the patentability of 'algorithms' are necessarily limited to the more narrow definition employed by the Court.").

62. The same inquiry occurred in Dann v. Johnston, 425 U.S. 219 (1976). The patent application in question claimed an automated system of customer record-keeping for bank checks and deposits. The PTO rejected the claims on several grounds. The CCPA held that properly-construed claims were limited to a machine, and therefore reversed. *In re* Johnston, 502 F.2d 765, 771 (C.C.P.A. 1974), *rev'd sub. nom.* Dann v. Johnston, 425 U.S. 219 (1976). On review, the Supreme Court held the claims unpatentable under the criteria of obviousness of § 103 after pretermitting the question of patentable subject matter under § 101. 425 U.S. at 220. Nevertheless, the Court paused to describe the claimed method as "saving the customer the time and/or expense of conducting this bookkeeping himself." *Id.*

B. Parker v. Flook

In *Flook*,[63] the applicant's claims, directed to a computer driven monitoring of a chemical catalytic process that permitted periodic updating of alarm limits, were rejected by the PTO as unpatentable.[64] The PTO contended that the only novelty was the use of a newly identified formula that permitted calculation of the appropriate alarm limit for the catalytic process under varying conditions.[65] The CCPA reversed on the ground that the claims were limited to the use of the new formula to continuously update alarm limits in the specific catalytic processing of hydrocarbons.[66] The PTO sought review to avoid the need to "process thousands of additional patent applications" on computer programs.[67]

In an opinion by Justice Stevens, the Supreme Court held the claims unpatentable under § 101.[68] The Court decided whether a newly discovered formula could define a patentable invention when applied to an old rubber curing process and supervised by a computer instantaneously calculating results on continuously-supplied temperature data. Unlike in *Benson*, the claim asserted some 'post-solution' physical activity, the actual 'updating' of an alarm limit indicating a completed cure. However, as in *Benson*, the Court addressed whether the *claims* were directed to the added value of the use of software over human processing or mental steps. In the first section of the *Flook* opinion, the Court addressed the question of whether the new formula, if known to the public, could be used by machinery other than computers to arrive at the same result:

> The only difference between the conventional methods of changing alarm limits and that described in respondent's application rests in the second step—the mathematical algorithm or formula. *Using the formula, an operator can calculate an updated alarm limit* once he knows the original alarm base, the appropriate margin of safety, the time interval that should elapse between each updating, the

63. 437 U.S. 584 (1978).
64. *Id.* at 587.
65. *Id.*
66. *Id.*
67. *Id.* at 587-88.
68. Justice Stevens later indicated opposition to any patentability for software. *See* Diamond v. Diehr, 450 U.S. 175, 193 (1981) (Stevens, J., dissenting).

> current temperature (or other process variable), and the appropriate weighting factor to be used to average the original alarm base and the current temperature. . . .
>
> Although the computations can be made by pencil and paper calculations, the abstract of the disclosure makes it clear that the formula is primarily useful for computerized calculations producing automatic adjustments in alarm settings.[69]

But, as in *Benson*, the Court did not conclude that the claims were limited to electronic processing or that they contained some other limitation that would preclude preemption of simultaneous human calculation.[70] Additionally, there was not a time limit on obtaining the solution. In short, the claims as construed by the Court covered manual calculation as well as computerized manifestations:

> The patent claims cover any use of respondent's formula for updating the value of an alarm limit on any process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons.[71]

Once the new parameters of the formula describing the reaction process were generally known, the submitted claim would preclude use of that formula by anyone, including "by head and hand." Although the use of a new formula to develop a wholly new process might enable a new process to be patentable,[72] the Court noted that the claims at issue did not cover a new process at all. Other than the formula and the

---

69. 437 U.S. at 585-86 (emphasis added).

70. Bruzga concurs, although casting it as an issue of overbreadth rather than preemption of human activity:

> Accordingly, the claims in *Flook*, which were acknowledged by the *Flook* Court as covering a broad range of embodiments, were arguably not even supported by a single, enabled embodiment. Under the overbreadth doctrine, the claims at issue would be invalid under Section 112. The same result was reached by the *Flook* Court, but on the express basis of Section 101 and case law interpretation of this Section.

Bruzga, *supra* note 8, at 207.

71. 437 U.S. at 586.

72. *Id.* at 591 (citing Mackay Radio & Tel. Co. v. Radio Corp. of Am., 306 U.S. 86, 94 (1939)).

resultant calculated alarm limits, every part of the claimed process, from catalytic conversion to monitoring to recalculating alarm limits to the use of computerized monitoring, was old.[73] The Court held:

> Respondent's process is unpatentable under § 101, not because it contains a mathematical algorithm as one component, but because once that algorithm is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention.[74]

The Court disposed of the post-solution activity issue by noting that the activity in the instant claim was trivial and exalted "form over substance."[75] Further, the Court contended that permitting "post-solution" activity to have determining weight would permit patent protection for theorems and formulae because a "competent draftsman could attach some form of post-solution activity to almost any mathematical formula."[76] However, the Court was cognizant of the fact that the claims in both *Benson* and *Flook* could result in some transformation of input data.[77]

The only remaining question for the Court to answer was whether a newly discovered formula could be patentable in and of itself when the formula has limited applicability to a particular industry. In *Flook*, the Supreme Court stated that this question had been decided in *Benson*.[78] *Benson*, however, dealt not with a novel mathematical formula about a specific chemical process, but with a simple conversion of decimal to binary numeration, a general mathematical process available since antiquity. Older case law defines formulae as unpatentable when those formulae are descriptions of scientific truth or laws of nature, like chemical reactions.[79] Hence, there is an established rule that laws of nature cannot be the subject of a patent.[80] As stated by the court in

---

73. *Id.* at 594.
74. *Id.*
75. *Id.* at 590.
76. *Id.*
77. *Id.* at 590 n.11 (noting that the claims in *Benson* also had "specific end use contemplated for the algorithm").
78. *Id.* at 585. Later, however, the opinion in *Flook* recognizes that the established rule on the patentability of formulae was restated in *Benson*. *Id.* at 589.
79. As stated in *Flook*, "[t]he underlying notion is that a scientific principle, such as that expressed in respondent's algorithm, reveals a relationship that has always existed." *Id.* at 593 n.15.
80. *See* Funk Bros. Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 130 (1948) ("He who

Flook, "[w]e think this case must also be considered as if the principle or mathematical formula were well known."[81]

C. Negative Precedent Sets the Rules of the Hunt

Ironically, the principles underlying permissible patentability of computer software under § 101 can be derived from the Supreme Court cases that hold claims of software patent applications unpatentable.

First, each separate mathematical algorithm, law of nature, or formula, is presumed old and not a subject for a new claim. A natural law or formula, even though newly proven or discovered, nonetheless describes a process that has long existed.[82] Thus, regardless of whether the formula is a new scientific development, the features of an algorithm that are descriptive of natural events are conclusively considered as old.[83] Second, the process of thought and the implementation of the new algorithm, even when undertaken with new insight, are considered old processes since the human mind has the ability to adapt and use new information. "It is self-evident that thought is not patentable."[84] Finally, a claim to novel computerized processing cannot include within its scope any of those features of the software that are duplicated by the natural process (the formulae or algorithms) and the human process (thought or mental steps).[85] The claim must cover only the added value that is unique

---

discovers a hitherto unknown phenomenon of nature has no claim to a monopoly of it which the law recognizes. If there is to be invention from such a discovery, it must come from the application of the law of nature to a new and useful end."); *see also* LeRoy v. Tatham, 55 U.S. (14 How.) 156 (1852).

81. 437 U.S. at 592.

82. *See generally* ARISTOTLE, THE POSTERIOR ANALYTICS, *reprinted in* INTRODUCTION TO ARISTOTLE, at 102-09 (Richard McKeon ed., 1947).

83. *See In re* Walter, 618 F.2d 758, 765 (C.C.P.A. 1980) ("The common thread running through prior decisions regarding statutory subject matter [*Benson* and *Flook*] is that a principle of nature or a scientific truth (including any mathematical algorithm which expresses such a principle or truth) is not the kind of discovery which the patent laws were designed to protect.").

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

85. This aspect of the preemption inquiry distinguishes the mental steps cases. "Although in view of our decision here we find it unnecessary to analyze and/or review in depth the so-called 'mental steps' doctrine, it would appear that the *disclosure* of apparatus for performing the process wholly without human intervention merely shows that the *disclosed* process does not fall within the so-called 'mental steps' exclusion." *In re* Prater, 415 F.2d 1393, 1403-04 (C.C.P.A. 1969) (claim, when read in light of specification, "does not cover a mental process."). Under the *Benson-Flook* inquiry, regardless of disclosure of machinery, when the plain meaning of the claims covers parallel mental steps, the claims are unpatentable. *But see* Simenauer, *supra* note 29, at 888 ("After *Prater*, the PTO could no longer use the mental steps doctrine as a basis for denying a patent for a computer

to the software capability, as well as being described, novel, nonobvious, and enabled.[86]

In short, the determination of patentable subject matter in software depends on whether the claim is limited in scope to a novel and unique aspect of processing other than that which can be found in the human mind or in the laws describing other natural processes.[87] The test of software subject matter patentability derived from *Benson* and *Flook* rests, therefore, on the paradigm that computer software mimics the functions of the human mind; but, when properly claimed, computer software contributes to speed, automaticity, instantaneous accuracy, and physical efficiency.

D. Diamond v. Diehr

In *Diehr*,[88] the patent applicants sought claims to an improved method of curing molded synthetic rubber.[89] Prior efforts at accurately predicting cure conditions and times had been limited by the inability to assess instantaneous changes in the temperature inside the molding press.[90] The "time necessary to raise the mold temperature to curing temperature" became an unpredictable variable,[91] because even if one knew the number continuously one still did not have sufficient calculation time, "thus making it difficult to do the necessary computations to determine cure time."[92] The inventors "continuously measur[ed] the actual temperature

---

program embodying a mathematical algorithm, despite the fact that such a program could be executed through mental calculations."). This Article contends that, closely read, the *Benson-Flook-Diehr* trilogy's adoption of the preemption test is a reworking of the mental steps doctrine, and thus remains the PTO's principal means to deny software patentability.

86. The importance of the exact text of the claims, and the possibility that a claim might cover manual computation by informed human intervention, is best demonstrated by Justice Stevens's publication of redrafted *Diehr* claims that correspond in scope to those in *Flook*. Diamond v. Diehr, 450 U.S. 175, 210 n.32 (1981) (Stevens, J., dissenting). Interestingly, Justice Stevens deletes all the components of the *Diehr* claim directed towards the added value of computerization, including repetitive recalculations and responding to near instantaneous results.

87. *See Walter*, 618 F.2d at 765 ("Since a statutory invention may *employ* a scientific truth, a decision as to whether the invention utilizing such truth is statutory must necessarily rest on the relationship which the truth or principle bears to the remainder of the substance of the invention as claimed."). Alternatively, of course, the claim could include limitations that would limit its scope to machine performance, such as automaticity or speed.

88. 450 U.S. 175 (1981).

89. *See id.* at 177.

90. *See id.* at 178.

91. *Id.* at n.3.

92. *Id.* at 178.

in the closed press through the use of a thermocouple," and then, using in a known standard formula the instantaneous value of temperature, calculated continuously the predicted time at which cure was complete.[93] Under the Court's construction of the claims, the "improved method of calculation," using a computer, "recited an improved process for molding rubber articles by solving a practical problem which had arisen in the molding of rubber products."[94] Computerization solves practical problems when time, speed, need for accuracy, or volume of data are sufficiently important parameters to preclude manual solution. This is the essence of identifying "preemption."[95]

The PTO rejected the claims under § 101. The CCPA reversed, holding that the claims as drawn recited an improvement in the process previously done manually.[96] The Supreme Court affirmed the claims patentability under § 101. In *Diehr*, the applicants did "not seek to pre-empt the use of that equation."[97] Hypothetically, the claims did not preclude use of the equation by human minds. Further, the court stated that

> one does not need a "computer" to cure natural or synthetic rubber, but if the computer use incorporated in the process patent significantly lessens the possibility of "overcuring" or "undercuring," the process as a whole does not thereby become unpatentable subject matter.[98]

---

93. *See id.* at 178-79 ("Respondents characterize their contribution to the art to reside in the process of constantly measuring the actual temperature inside the mold. These temperature measurements are then *automatically* fed into a computer which *repeatedly recalculates* the cure time by use of the Arrhenius equation . . . According to the respondents, the *continuous measuring* of the temperature inside the mold cavity, the feeding of this information to a digital computer which *constantly recalculates* the cure time, and the signaling by the computer to open the press, are all new in the art." (emphasis added)).

94. *Id.* at 181.

95. *See id.* at 187 ("Their process admittedly employs a well-known mathematical equation, but they do not seek to pre-empt the use of that equation.").

96. *See In re* Diehr, 602 F.2d 982, 983 (C.C.P.A. 1979) (The inventors characterized "their contribution to the art as residing in the step of repeatedly or constantly measuring the actual temperature in the mold."), *aff'd sub. nom.* Diamond v. Diehr, 450 U.S. 175 (1981).

97. 450 U.S. at 187.

98. *Id.*; *see id.* at 188 ("equation is not patentable in isolation," unless the invention "incorporates in it a more *efficient* solution of the equation" (emphasis added)); *id.* at 193 n.15 (claimed invention results in "product that has been perfectly cured—a result heretofore unknown in the art"); *see also id.* at 209 (Stevens, J., dissenting) ("What they claim to have discovered, in essence, is a method of updating the original estimated curing time by repetitively recalculating that time pursuant to a well-known mathematical formula in

In summary, the claims of the applicants in *Diehr* covered an improvement over the manual application of the same equation and the input data.[99] The ability to measure conditions continuously and use that data to instantaneously calculate cure times was a use of a software program to improve upon, and substantively distinguish from, potential human intervention, *and* the claims were expressly directed to that distinction.[100] In short, the claims were drawn narrowly to cover the enhancement afforded by the computer's speed, improved accuracy, and automaticity.[101]

---

response to variations in temperature with the mold . . . .").

99. *See id.* at 179 n.5. The claims in *Diehr* expressly included the steps of "repetitively calculating in the computer, at frequent intervals during each cure" and "repetitively comparing in the computer at said frequent intervals during the cure," which took the claims out of the range of possible manual duplication. *Id.*

100. *See In re* Abele, 684 F.2d 902, 907 (C.C.P.A. 1982) (Manually duplicated process in *Diehr* "might not work as well since the in-mold time would not be as accurately controlled.").

101. This analysis underscores the difficulty that litigants have had in distinguishing § 101 patentability issues from § 102 novelty issues, explored by the Supreme Court in both Parker v. Flook, 437 U.S. 584, 588 (1978), and *Diehr*, 450 U.S. at 189-91. *See also Diehr*, 450 U.S. at 193, 211 (Stevens, J., dissenting). This problem is explored at length by Judge Rich in *In re* Bergy, 596 F.2d 952, 960-67 (C.C.P.A. 1979), *aff'd sub. nom.* Diamond v. Chakrabarty, 447 U.S. 303 (1980). As stated by the CCPA, "[t]o provide the option of making such a rejection under either § 101 or § 102 is confusing and therefore bad law." *Id.* at 961. The confusion is created by the hypothetical treatment of human activities and natural physical and chemical processes as having a form of "antedating" power under § 101. The inquiry under § 101 creates, in this hypothesis, a conclusive presumption that: (1) laws of nature and scientific truths, even if their mathematical representations are newly discovered, predate the filing date of any patent application, and (2) that the human brain is a form of "prior art" computer software that can be programmed, i.e., educated, by reading the specification. In the event that the newly programmed human computer, armed with the new equations, can equivalently perform the function of the *claimed* software, the software *as claimed* is unpatentable. As thus phrased, the difficult novelty concept embedded in the § 101 inquiry becomes apparent as a legal conclusion of priority for natural laws and human computers based upon hypothetical prior existence. This is the concept that Justice Stevens expresses in *Flook* when he states that mathematical formulae or principles must be considered as "well known." *Flook*, 437 U.S. at 592.

Another way of phrasing the issue is that if the claimed process can be duplicated by human activity, the claim is unpatentable under § 101. This is a form of "prior art," in that, without documentation or knowledge of the exact process of human thought, if the claimed process covers human thought, then the possibility exists that the human brain has duplicated the process before in the same manner as the claimed one. This form of "prior art," the human mind, is evaluated under the legal rubric of patentable subject matter, or 35 U.S.C. § 101, rather than § 102. An example can be drawn from athletics. Assume a basketball player perfects the technique of a three-point play in which one can be assured of being fouled on every field goal attempt. The process of crouching, setting up, repeating body and head fakes, and leaping into the opponent when she is fooled into leaving the ground, is apparently new, invented, and perhaps non-obvious at the time of invention, and, further, can be enabled through written instructions. Nonetheless, the process is not patentable subject matter, because there can never be assurance of complete novelty or prior

Under the paradigm governing comprehension of computer software, programs become patentable only when they exceed possible human functions. The paradigm also requires that the patent claims only those computer features that go beyond human capabilities, including speed, automaticity, improved reliability of calculations, and rapid and simple access to enhanced volumes of information.

There are two principal questions in the § 101 software inquiry: first, whether the claims preempt the use of an analogous algorithm, formula, or equation by a "human computer";[102] second, whether a human being, exposed to the disclosure within the specification, could learn to perform the claimed function equivalently. This latter question differs subtly from the mental steps doctrine, although the concept is an heir to that doctrine.[103] The question is not whether the patent claims mental steps, but whether the claims, if enforced, would effectively preclude use of manual labor or thought to perform the same task. Finally, the Supreme Court's evaluation of computer software patent protection suggests that the inquiry may also include whether an invention's use of software is distinguishable from human activity by virtue of the specific substantive advantages of computer use. This is the "preemption" test as elucidated by *Benson*, *Flook*, and *Diehr*.

---

use by another. Thus, the concepts of "novelty" and "patentable subject matter" can be seen to merge confusingly when dealing with a claimed process that can be duplicated by human implementation or intervention, as could be the claimed processes in *Flook* and *Benson*. Manual or human duplication implies preemption. *See, e.g.*, *In re* Meyer, 688 F.2d 789, 795-96 (C.C.P.A. 1982) ("Appellants' specification and arguments indicate that their invention is concerned with replacing, in part, the thinking processes of a neurologist with a computer."). *But see* Gregory J. Maier, *Software Protection—Integrating Patent, Copyright, and Trade Secret Law*, 69 J. PAT. OFF. SOC'Y 151, 154 (1987) ("[*Flook*] truly marks the low point for patent protection of software inventions. The [C]ourt's approach improperly imported into its analysis of eligibility of subject matter for patent protection (under § 101) the consideration of novelty and 'inventiveness' which are the proper concerns of §§ 102 and 103."); Simenauer, *supra* note 29, at 902-05 ("[T]he *Flook* court clearly confused these statutory provisions [§ 102 and § 103] with those of section 101.").

102. *See, e.g.*, *In re* Christensen, 478 F.2d 1392, 1393-94 (C.C.P.A. 1973), in which the court stated that "the only real issue before us is whether the method claims, which recite a mathematical formula at the point of novelty, define a statutory process within the meaning of 35 U.S.C. § 101." The court ended by "concluding that the answer is in the negative." *Id.* at 1394.

103. The distinction rests on the need to assess, under "preemption," whether the claims could cover, after public disclosure of the underlying scientific truths or mathematical equations, head, hand, ruler, and mathematician solution, rather than whether the claims are limited to "a purely mental process or step." *In re* Prater, 415 F.2d 1393, 1402 (C.C.P.A. 1969). Under the purely mental steps theory, any non-mental step would escape exclusion from patentability. *See supra* note 29.

E. Environment, Context, and the Vitality of Flook

Two questions remain after *Diehr*. First, what is the continuing role of claimed pre-solution or post-solution activity (that is, the environment or context in which the claimed computer software operates)? Second, did the Court in *Diehr* overrule or modify *Flook*?

In *Diehr* the Court held that the algorithm or mathematical equation in the claims as drafted did not preempt use of the equation.[104] Additionally, the Court found that the claim was otherwise patentable subject matter because it was not an idea but rather a "transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing."[105] These two holdings, or requirements for software patentability, are hereinafter referred to as the "preemption" and "transformation" inquiries, respectively. The transformation inquiry is also phrased to approve claims that "only . . . foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process."[106] These are separable inquiries. The first addresses preemption of human use of the equation by "head and hand." The second addresses whether the particular claimed use is a process with a product, or a transformation and reduction of a particular entity, such as input data, to a different state, rather than an idea or "patent protection for that formula in the abstract."[107] Confusion may arise because the transformation inquiry of § 100(b) was expressly found to be satisfied in the minimal, purely mathematical transformation in the claims in *Flook*.[108] In *Abele*, the Court subsequently implements the transformation inquiry, in imparting significant and substantial requirements that cannot be found in the Supreme Court precedent. Despite the presence of a specific

---

104. 450 U.S. at 187.

105. *Id.* at 184.

106. *Id.* at 187.

107. *Id.* at 191.

108. *See* Parker v. Flook, 437 U.S. 584, 589-90 (1978). "Respondent correctly points out that this language [absence of claimed practical application except in connection with a digital computer] does not apply to his claims. He does not seek to 'wholly preempt the mathematical formula,' since there are uses of his formula outside the petrochemical and oil-refining industries that remain in the public domain." *Id.* at 593. The error made by the applicants in *Flook*, the Court stated, was in assuming that just providing transformation or reduction to a different state in a particular setting was enough, i.e., "that if a process application implements a principle in some specific fashion, it automatically falls within the patentable subject matter of § 101" without considering the question of preemption of "ideas" and thought. *Id.* The applicants' claim in *Flook* did, however, preempt manual use of the formula, albeit limited to the particular field of endeavor. *See id.* at 594-95.

claimed environment and an acknowledged transformation, the claims in *Flook* were held unpatentable because the claims as drafted were preempted.[109]

This raises the question of whether in the § 101 analysis the Court had changed its view of the importance of the claimed transformation or the context of the other non-mathematical steps. The answer is found in the last section of the *Diehr* opinion in which Justice (now Chief Justice) Rehnquist seeks to explain the separable analysis of "preemption" of human thought and the question of whether the claims are drafted to an "idea" or to a finite transformation process in a defined physical environment as differing parts of the § 101 inquiry. In discussing the question of patenting an idea, the Court stated:

> We view respondents' claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula. We recognize, of course, that when a claim recites a mathematical formula (or scientific principle or phenomenon of nature), an inquiry must be made into whether the claim is seeking patent protection for that formula in the abstract. A mathematical formula as such is not accorded the protection of our patent laws, *Gottschalk* v. *Benson*, 409 U.S. 63 (1972), and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment. *Parker* v. *Flook*, 437 U.S. 584 (1978).[110]

The Court thus explains that the presence of a mathematical equation in a claim raises two issues, one under *Benson* and the other under *Flook*. First, under *Benson*, if the claim has a formula, does the claimed process work a transformation? Second, under *Flook*, does the process nonetheless preempt human use, by head and hand, of the formula? To the extent that any doubt as to the continuing vitality of *Flook* remained, the Court specifically stated:

> Our reasoning in *Flook* is in no way inconsistent with our reasoning here. A mathematical formula does not suddenly

---

109. *See id.* at 589-91.
110. *Diehr*, 450 U.S. at 191.

> become patentable subject matter simply by having the applicant acquiesce to limiting the reach of the patent for the formula to a particular technological use. A mathematical formula in the abstract is nonstatutory subject matter regardless of whether the patent is intended to cover all uses of the formula or only limited uses.[111]

The question of preemption is more crucial than the requirement for a transformation which is readily satisfied. Thus, there is less need to examine the other steps of the claim for environment or context than to pay close attention to possible coverage of head and hand by the claim.[112]

The existence or non-existence of claimed post-solution or pre-solution physical activity, or steps to a physical environment, under *Benson-Flook-Diehr*, is simply not conclusive with regard to either preemption or being a patentable transforming process. The former requires analysis of whether human or manual activity falls within the scope of the claim. The latter looks to transformation, but *data can be transformed* without the necessity for a physical environment, as in *Flook*. Indeed, in retrospect, *Flook* contended that the claims in *Benson* were drawn to a possibly permissible transformation, albeit to a pure number.[113]

Finally, *Flook* remains the law. Together, *Benson-Flook-Diehr* provide a blueprint for the patentability of software that requires the software to transform data. When the claims are limited to manifestations of computational ability that cannot be duplicated by man, they do not preempt human function. Therefore, a valid patent claim may express claim limitations to speed, time, accuracy, repetitiveness, volume of storage data, the amount of electronic memory employed by the process, or an exacting non-human environmental limitation.

---

111. *Id.* at 192 n.14. This Article contends that this reaffirmation of the irrelevance of post-solution activity, or field of use, in *Diehr*, and endorsement of the preemption test, demonstrates that the current Federal Circuit test, which looks to the other non-mathematical physical steps to provide patentability, is a misreading of Supreme Court precedent. *But see* Simenauer, *supra* note 29, at 896 ("However, in *Diehr*, the Court interpreted the automatic opening of the rubber-molding press as so closely related to the rubber-molding process itself that it considered this step to be sufficient postsolution activity to render the claim statutory subject matter.").

112. Hypothetically, in the absence of preemption, a claim without a transformation of one thing to another would not be a process, although case law reveals no such example.

113. 437 U.S. at 590 n.11 ("It should be noted that in *Benson* there was a specific end use contemplated for the algorithm.").

F. Flook *and the Lower Courts*

In later cases, the lower courts have indicated that the Supreme Court in *Diehr* may have modified its views of software patentability found in *Flook*, rather than reiterating, adopting, and expanding upon them. If so, a substantive inquiry into transformation, or the environment and the context of the non-mathematical parts of the claimed invention, would be important for analyzing patentability. The view that the rules changed from *Flook* to *Diehr* can be found in later CCPA and Federal Circuit cases, as discussed below. To that end, in *Arrhythmia Research*,[114] the Federal Circuit noted:

> Although commentators have differed in their interpretations of *Benson*, *Flook*, and *Diehr*, it appears to be generally agreed that these decisions represent evolving views of the Court, and that the reasoning in *Diehr* not only elaborated on, but in part *superseded*, that of *Benson* and *Flook*.[115]

---

114. Arrhythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053 (Fed. Cir. 1992).

115. *Id.* at 1057 n.4 (emphasis added); *see also id.* at 1061 ("The Supreme Court cut the knot by strictly limiting *Benson*. . . [and] turned away from the *Benson* algorithm rule."); *In re* Grams, 888 F.2d 835, 838 (Fed. Cir. 1989) (Decision in *Chakrabarty* "seems to reflect a change from *Flook*'s admonition that 'we must proceed cautiously when we are asked to extend patent rights into areas wholly unforeseen by Congress.'" (citation omitted)); *In re* Abele, 684 F.2d 902, 906 (C.C.P.A. 1982) ("This conclusion rests on the premise that an otherwise statutory process remains statutory when implemented by a computer, a premise subsequently approved by the Supreme Court in *Diamond v. Diehr*." (citations omitted)). *Diehr* did not approve the proposition that implementation by a computer raises no new questions of patentability, which would have overruled *Flook*'s holding that implementation by a computer implicitly raises questions of preemption. Both *Flook* and *Diehr* support the need for an inquiry into preemption for a computerization claim regardless of whether the claim is limited to a particular environment. *See also In re* Taner, 681 F.2d 787, 791 (C.C.P.A. 1982), which stated that "[m]uch has transpired in the development of the law in this area since our decision in *Christensen*. Most recently in *Diehr*, the Supreme Court made clear that *Benson* stands for no more than the long-established principle that laws of nature, natural phenomena, and abstract ideas are excluded from protection . . . ." *Benson*, however, also required an examination of preemption of use of the natural law by the software claim. Gottschalk v. Benson, 409 U.S. 63, 72 (1972). Also see *In re* Walter, 618 F.2d 758, 764 (C.C.P.A. 1980), in which the court stated that "[t]he determination of statutory subject matter under § 101 in the field here involved has proved to be one of the most difficult and controversial issues in patent law." *See also* R. Lewis Gable & J. Bradford Leaheey, *The Strength of Patent Protection for Computer Products: The Federal Circuit and the Patent Office Refine the Test for Determining which Computer-Related Inventions Constitute Patentable Subject Matter*, 17 RUTGERS COMPUTER & TECH. L.J. 87, 101 (1990) ("Apparently overruling the first part of *Flook*, the Supreme Court [in *Diehr*] clearly discarded the 'point of novelty' approach to claim analysis"); Maier, *supra* note 101, at 154 ("Finally, in *Diamond v. Diehr*, the

This view is not legally accurate and has led to the imposition of a physical transformation, environment, context, or "interrelationship of the algorithm to the remaining limitations of claim"[116] requirement that was expressly rejected as being not probative of patentability in *Flook*. Support for the contention that *Flook* and *Diehr* are irreconcilably inconsistent can be inferred from the following facts. First, while *Benson* had no dissenters, the opinion in *Flook* was accompanied by a dissent joined by three justices, including Justice Rehnquist, the author of the *Diehr* opinion. Thus, a superficial glance at the holdings, the first two denying patentability, and the last affirming it, with the earlier dissenters authoring the *Diehr* majority opinion, would indicate a change in the Court's attitude. This analysis ignores both the adoption of *Flook* by the majority in *Diehr* and the expressly identified limitations of the holdings. Second, the author of *Flook*, in dissent in *Diehr*, states the view that the majority opinion in *Diehr* could not be sustained by his reading of *Flook*. Danger historically lurks in reading a dissent to divine the impact and decisional parameters of a majority opinion. However, in practice, dissents are frequently used to those ends.[117] Third, failure of the Supreme Court to review later cases may indicate that the Supreme Court became convinced in *Diehr* that patent jurisprudence was better left to the lower courts. This theory ignores the intervening creation of the Federal Circuit, with combined jurisdiction, shortly after the *Diehr* decision. Given the legislative history suggesting that the Federal Circuit should unify the laws under its jurisdiction, the failure to grant certiorari on more software patent cases soon after *Diehr* is readily understood. Finally, there may be a belief that the reasoning in the *Flook* opinion could not possibly support a patentability determination in *Diehr*.[118] As the discussion of the holding of *Diehr* makes clear, however, reconcilia-

---

Supreme Court changed direction and upheld the eligibility . . . ."); Simenauer, *supra* note 29, at 897 ("Unfortunately, *Diehr* did not expressly overrule the dicta in *Flook* that raised issues concerning the obviousness of computer-related inventions under section 103."); Stern, *supra* note 6, at 374 ("The CCPA, convinced that the Supreme Court did not understand the situation, then ruled that the *Benson* decision was limited to method claims.").

116. *In re* Abele, 684 F.2d 902, 906 (C.C.P.A. 1982).

117. *See, e.g.*, Maier, *supra* note 101, at 156 ("Stevens' dissent . . . concludes that the most significant difference between the cases was not in the character of the inventions, but rather in the manner in which the claims were drafted.").

118. *See, e.g.*, *In re* Abele, 684 F.2d 902 (C.C.P.A. 1982); *In re* Diehr, 602 F.2d 982 (C.C.P.A. 1979), *aff'd sub. nom.* Diamond v. Diehr, 450 U.S. 175 (1981); *see also infra* note 135 (discussion of CCPA critique of *Flook*).

tion depends on an understanding of the meaning of the "preemption" test under § 101 for software patentability. The claim presented in *Flook* preempted parallel human use of the formula; the claims in *Diehr* did not. Transformation from one state or thing to another, found in both *Flook*'s updating of the alarm limit and *Diehr*'s mold opening, was simply not a distinguishing issue.

The consequence of viewing *Flook* and *Diehr* as inconsistent has inevitably resulted in a physical transformation requirement or examination of the environment or the context of the algorithm within the claim, as shown by the other steps in the claimed software. The basis for this analysis is the arguably different importance or significance of the software environment to the claimed invention in *Flook* (merely updating alarm limits) as compared to that in *Diehr* (supervising entire molding process). Such an inquiry ignores benefits imparted by novel and inventive software, which should stand or fall on its own non-obviousness, regardless of the environment. Nor is such a view required by Supreme Court software jurisprudence. First, software can transform data for human use and provide new information, not previously accessible, by virtue of its speed, automaticity and volume of data storage. This is a physical transformation under *Cochrane v. Deener*.[119] Attention to this aspect of the benefits of software would permit protection of novel developments in the science of computer programming that other forms of intellectual property protection cannot provide. Second, the many benefits of computerization and software could be increased if protection focused on aspects of software creativity, including calculations or data transformations using less memory, fewer steps, or greater speed. In such circumstances, the environment or context may not have changed, and thus potential patent protection will have been lost under current law. The claim and patentability analysis should focus on the aspects of software creativity that provide demonstrable commercial benefits. Neither the preemption nor transformation requirements for § 101 patentability, as implemented in Supreme Court jurisprudence, bar such an inquiry.

In an allied area, biotechnology, patentability has turned on the unique characteristics of the new products, rather than on an arbitrary analysis of the particular use or a limiting setting. To that end, patentability of a micro-organism that digests petrochemicals does not rest on the complete

119. 94 U.S. 780, 788 (1876).

novelty of the organism *per se*, nor on the existence of claim limitations setting forth an environment of an oil spill. Rather, patentability is dependent on the claim limitation that the organism is isolated, purified, characterized, or grown *in vitro*.[120] These are the added values imparted by biotechnological techniques. Software has similar differentiating added value.

III. *FREEMAN-WALTER* INQUIRY

A. In re *Freeman*

Contemporaneously with the evolution of the *Benson-Flook-Diehr* trilogy, the CCPA was struggling both to discern the intent of the reviewing Court, and to address repeatedly appealed cases. Two principal CCPA cases, *In re* Freeman[121] and *In re* Walter,[122] set forth the early development of software patentability law.[123] Following the Supreme Court opinion in *Diehr*, the test was significantly modified in *In re Abele*.[124] The *Abele* standard became the new law for computer software patentability and remains the current law, except possibly to the extent challenged in the concurring opinion in *Arrhythmia*.

In *Freeman*, the patentee claimed the use of a data processor or computer to calculate a positioning formula that identified the relative location of symbols on a CRT visual display for use in typesetting scientific equations.[125] The PTO rejected the patentee's claims, citing the *Benson* rule that formulae, used by software, are unpatentable.[126] The CCPA, however, reversed, stating that the claims at issue were not directed to an algorithm in the sense intended by *Benson*.[127] The claims in question, although incorporating a formula from which data were converted to results, were only a "step-by-step" delineation of a "proce-

120. Diamond v. Chakrabarty, 447 U.S. 303 (1980).
121. 573 F.2d 1237 (C.C.P.A. 1978).
122. 618 F.2d 758 (C.C.P.A. 1980).
123. The synthesis of these two cases is later described as the "*Freeman-Walter*" test. *See In re* Iwahashi, 888 F.2d 1370, 1374 (Fed. Cir. 1989); *see also* Arrhythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053, 1058 (Fed. Cir. 1992); *In re* Grams, 888 F.2d 835, 838 (Fed. Cir. 1989).
124. 684 F.2d 902 (C.C.P.A. 1982).
125. 573 F.2d at 1238-40.
126. *See id.* at 1242.
127. *See id.* at 1245. The definition of algorithm, and its misunderstanding, have become crucial to software patentability. *See supra* note 60 and accompanying text.

dure for accomplishing a given result."[128] This could not have been what was meant by "'algorithm' in the *Benson* sense of that term," because all method claims break down processes into steps.[129] In *Freeman*, none of the steps in the claims were "themselves mathematical calculations, formulae, or equations."[130]

Freeman set forth a preliminary inquiry to a determination of the subject matter patentability of claims with mathematical contents or expressions.[131] This preliminary inquiry is designed to avoid categorizing all process claims as algorithms or steps of activity, even if phrased in mathematical language.[132] Initially, a court must decide whether any of the mathematical representations recited in the claims reflect an attempt to claim a law of nature, a formula describing a scientific truth, or "a procedure for solving a given type of *mathematical* problem."[133] In short, before making a *Benson-Flook-Diehr* inquiry at all, a software claim must contain a solution, expressed in mathematical terms, to a natural, chemical, or scientific problem. The second step is to determine, when such a recitation is present, whether the recited mathematical solution "wholly pre-empts that algorithm."[134] This second inquiry reflects the tests evolved in the *Benson-Flook-Diehr* trilogy, which assess whether human intellectual activity, perhaps learned from the specification, is encompassed within the scope of the claims, or whether, alternatively, the claims are narrowly drawn to the advantages gained by the use of electronic computational machinery.

Freeman, by defining a step before the *Benson-Flook-Diehr* inquiry, permitted development of the law dealing with software patentability. Further, the focus on the preliminary inquiry offered the potential again to review, without significant Supreme Court oversight, a PTO historically reluctant to accept subject matter jurisdiction over software.[135]

---

128. 573 F.2d at 1246.

129. *Id.*

130. *Id.*

131. *See, e.g., In re* Johnson, 589 F.2d 1070, 1075 (C.C.P.A. 1978) (algorithm simply incidental to producing claimed noise-free signal).

132. *See Freeman*, 573 F.2d at 1246 n.8.

133. *Id.* at 1245 (citing Gottschalk v. Benson, 409 U.S. 63, 65 (1972)).

134. *Id.* By which it is meant, after *Flook*, that even when the algorithm is limited to a specific subset of physical activities, like petrochemical art, parallel human computation does not fall literally within claim scope.

135. *See, e.g., In re* Bradley, 600 F.2d 807 (C.C.P.A. 1979), *aff'd mem. sub. nom.* Diamond v. Bradley, 450 U.S. 381 (1981) (equally divided court with Burger, C.J., not sitting). That the CCPA may not have been entirely receptive to Supreme Court review of software patentability issues should not come as a surprise. *See, e.g., In re* Walter, 618

Freeman held that the ability to model a process mathematically by placing symbols in their proper positions in two dimensions is not a function that duplicates or expands on human functions. The paradigm is simply inapplicable. An inquiry into preemption would make little sense. The invention in *Freeman* demonstrates that software for a computer can operate in a fundamentally different way from human mental steps, business transactions, or human thought. By phrasing the inquiry as one into whether the steps of the software, clearly an algorithm under any sensible mathematical meaning of the term, are an algorithm within the scope of the *Benson-Flook-Diehr* inquiry, *Freeman* frees software from the limiting restraints of always being considered analogous to human thought.[136]

B. In re *Walter*

Walter applies the second step in the test described in *Freeman*, with the benefit of the *Flook* decision, and sets forth the scope of the required preemption and transformation inquiries.[137] The invention in *Walter* unscrambled incoming complex sonic signals initially sent into the earth

---

F.2d 758, 766 (C.C.P.A. 1980) ("We do not believe the Supreme Court has acted in a manner so potentially destructive."); *In re* Bergy, 596 F.2d 952, 959-63 (C.C.P.A. 1979) (Rich, J.), *aff'd sub. nom.* Diamond v. Chakrabarty, 447 U.S. 303 (1980) ("[W]e find in *Flook* an unfortunate and apparently unconscious, though clear, commingling of distinct statutory provisions which are conceptually unrelated" and "the briefs filed by the Solicitor General for Acting Commissioner Parker in *Parker v. Flook*, . . . badly, and with a seeming sense of purpose, confuse the statutory requirements of § 101 with a requirement for the existence of an 'invention'"); *In re* Christensen, 478 F.2d 1392, 1396 (C.C.P.A. 1973) (Rich, J., concurring) ("'Algorithm' has been used in the sense of a 'procedure for solving a given type of mathematical problem' and 'formula' is used in the sense of a mathematical formula. The Supreme Court in *Benson* appears to have held that claims drafted in such terms are not patentable—for what reason remaining a mystery.").

136. *See In re* Pardo, 684 F.2d 912, 916 (C.C.P.A. 1982) ("[U]nable to find any mathematical formula, calculation, or algorithm either directly or indirectly recited in the claimed steps."); *In re* Taner, 681 F.2d 787, 790 (C.C.P.A. 1982) ("Appellants' claims are not in our view merely directed to the solution of a mathematical algorithm. . . . Appellants' claims are drawn to a technique of seismic exploration which simulates the response of subsurface earth formations to cylindrical or plane waves. That that technique involves the summing of signals is not in our view fatal to its patentability."); *In re* Sherwood, 613 F.2d 809 (C.C.P.A. 1980) (seismic signals viewed as physical and not a claim to a mathematical operation); *In re* Johnson, 589 F.2d 1070 (C.C.P.A. 1978) (conversion of one physical thing into another not a claim to an algorithm); *In re* Toma, 575 F.2d 872 (C.C.P.A. 1978); *see also* Barrett, *supra* note 2, at 570 ("The traditional approach by the CCPA to the PTO's rejection of computer processes as nonstatutory subject matter has been to apply the two-part test for mathematical algorithms and to find statutory subject matter if the claims do not recite a mathematical algorithm.").

137. *See* 618 F.2d at 767.

and reverberated back from subsurface structures. Unscrambling the various sonic frequencies by their time intervals after departure permitted identification of the size, type and location of the various subsurface strata.[138] To determine this information, the computer was programmed to solve multiple equations with numerous unknown variables.[139] The claims were broadly directed towards this task.

The PTO rejected the claims because each of the operations set forth by the software-driven system was a mathematical solution to a problem.[140] Further, the PTO came to the dramatic conclusion that "the architecture of the computer used" and the fact that the steps of the claim were "to accommodate the input data to a memory, finite in size, requiring the tailoring and configuring of the data to the particular architecture of the memory" precluded the claims from being anything but a mathematical operation.[141] Thus, the PTO took the extreme position that the *use of an electronic computer to perform the claimed process made the invention,* ipso facto, *an unpatentable mathematical algorithm.* With regard to the more limited *Benson-Flook-Diehr* inquiry, however, the PTO concluded that the specific recited mathematical components "effectively pre-empted" any other use of the claimed mathematical steps.[142] Thus, with regard to a possible manual permutation, the PTO noted:

> [T]he total amount of calculation required for the purposes of producing a practical or useful result would be, we think, horrendous, and the effort so tedious and time consuming, as to render that alternative (if publicly available) or others like it, to be trivial in consequence.[143]

The CCPA affirmed the holding of the PTO with regard to whether

---

138. *See id.* at 760-61.

139. *See id.* at 761. The need to calculate multiple, near-simultaneous mathematical equations with multiple variables is a function that only a computer can readily perform and, therefore, cannot "preempt" (if properly claimed). Analysis of the claims, however, reveals no such limitation.

140. *See id.* at 762.

141. *Id.* (citation omitted).

142. *Id.* at 763 (citation omitted).

143. *Id.* (citation omitted). This is an accurate statement of the "preemption" test but also illustrates the impracticability of the test as applied to recently developed software. The stage in history at which computers were programmed to duplicate, and therefore replace (or preempt), human tasks is gone.

the asserted claim sought to preempt other uses of the claimed mathematical steps. The court initially addressed the solicitor's suggestion that the preemption inquiry required an evaluation of whether the claimed equation was at the point of novelty. The court noted that, although the *Benson-Flook-Diehr* inquiry required an assessment of the relationship between the scientific truth or mathematical equation and "the substance of the invention claimed,"[144] the inquiry was not the same as a "point of novelty" approach, in which the scientific truth is deleted from the claim and the residual analyzed for patentability.[145] Rather, the second step in the *Freeman* and *Benson-Flook-Diehr* test requires the court "to ascertain whether in its entirety [the claimed step] wholly preempts [the] algorithm."[146] The preemption is not "literal" in the sense that not every conceivable other use of the algorithm must be within the scope of claimed coverage.[147] Rather, the CCPA stated:

> In order to determine whether a mathematical algorithm is "preempted" by a claim under *Freeman*, the claim is analyzed to establish the relationship between the algorithm and the physical steps or elements of the claim. In *Benson* and *Flook*, no such relationship could be found; the entire claim was, in each case, drawn to the algorithm itself. The preamble in the claim involved in *Flook*, while limiting the application of the claimed method to a "process comprising the catalytic chemical conversion of hydrocarbons," did not serve to render the method statutory because the claim, as a whole, was still directed to the solution of the mathematical problem.[148]

Unfortunately, this statement of the second step in *Freeman*, which properly addresses preemption, instead addresses the different question of whether the claimed process works a "transformation," in the sense adopted by *Benson* from *Cochrane v. Deener*.[149] This statement of the

---

144. *Id.* at 765.

145. *Id.* at 766. This Article questions whether, in fact, subsequent CCPA and Federal Circuit cases have not adopted such a test.

146. *Id.* (quoting *In re* Freeman, 573 F.2d 1237, 1245 (C.C.P.A. 1978)) (second alteration in original).

147. *See id.* at 767. This added proviso on the meaning of "wholly" is not noted in *Abele*, which critiques the *Walter*'s opinion for use of "wholly" in the formulation.

148. *Id.*

149. One commentator suggests that the oft-quoted line from *Cochrane* about a process

transformation requirement was later picked up by *Abele* and its progeny as an "alternative" to the preemption inquiry. The difference in the two requirements rests on the fact that a mathematical algorithm cannot be patented and, therefore, cannot be the sole aspect of a claimed invention. An algorithm without specified input or output cannot be a process, as understood by the test in *Cochrane*. A process must do something with a specified input and change it. But this means simply that some input and some output, even pure numbers, must be specified in the claim to be a sufficient transformation under *Benson-Flook-Diehr*. *Flook* had a claim that did, in fact, make a transformation (updating alarm limits). Further, whether the claim has a transformation does not address the preemption inquiry required by the holdings in *Flook* and *Benson*. That the quoted passage deals with the transformation requirement, and not the preemption inquiry, is made manifest a few paragraphs later, when the court states:

> Once a mathematical algorithm has been found, the claim *as a whole* must be further analyzed. If it appears that the mathematical algorithm is implemented in a specific manner to define *structural relationships* between the *physical elements* of the claim (in apparatus claims) or to *define or limit claim steps* (in process claims), the claim being otherwise statutory, the claim passes muster under § 101.[150]

---

being "an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing," is dictum. Chisum, *supra* note 6. While this may well be true, the transformation requirement put into place by *Abele*, and mentioned by *Walter*, was significantly different from that contemplated in *Benson*, *Flook*, or *Diehr*. Arguably, in all three cases, the Supreme Court found the requirement that a process transform something from one state to another fulfilled. However, in only *Diehr* did the claim pass scrutiny under the preemption test. *Abele* contended that the transformation requirement was merely another form of the preemption requirement. Thus, not until *Abele* does a court require something more from transformation than the results of "number-crunching" from a process, namely an actual and significant physical transformation.

150. *Walter*, 618 F.2d at 767 (emphasis added). The paragraph directly following misreads the transformation requirement from *Benson* and *Flook* by stating that transformation to a pure number, as the alarm limits in *Flook*, is an impermissible transformation. The Court in *Flook* addressed the contention of the applicant that the conceded existence of actual post-solution activity rendered the issue different from the absence of any specific transformation in *Benson*. Parker v. Flook, 437 U.S. 584, 590 (1978) ("the adjustment of the alarm limit to the figure computed according to the formula"). The *Flook* court also contested whether *Benson* did not involve a transformation. *See id.* at n.11 (finding there was "a specific end use contemplated for the algorithm"). The *Flook* court stated that this missed the point of the "preemption" inquiry, when it stated that "respondent incorrectly assumes that if a process application implements a principle in some specific fashion, it

In contrast to this dicta, however, is the CCPA's holding in *Walter* that the apparatus and method claims were not patentable because of preemption. The apparatus claims were not drawn narrowly and would preempt the algorithm because the "functionally-defined disclosed means and their equivalents are so broad that they encompass any and every means for performing the recited functions."[151] In the case of the method claims, the recited steps were broadly directed "to perform[ing] the function of 'number crunching' (solving mathematical algorithms and making calculations)."[152] The claims were drawn to "a mathematical exercise which relates two mathematical functions."[153] "The calculations are the beginning and the end of the claims."[154] Further, as in *Flook*, the presence of an environment, or a "specific end use," did not save the claims because they were simply "drawn to a method of calculation, albeit improved."[155] In short, the holding of the CCPA was directed to the preemption inquiry raised in *Benson* and *Flook* because the "appellant claims the mathematical algorithm itself even though most of his claims limit its use to a particular art or technology."[156]

In dicta, however, the CCPA noted that the PTO's astonishing conclusion, that any computer-implemented process must of necessity be an unpatentable mathematical algorithm, was too broad. "It is itself misleading because it ignores what the computer is doing, concentrating on how it is being done."[157] The CCPA rejected the idea that *Benson* and *Flook* interpreted "algorithm" to mean that any and all software was unpatentable because software sets forth detailed mathematical steps to achieve particular results.[158]

---

automatically falls within the patentable subject matter of § 101 and the substantive patentability of the particular process can then be determined by the conditions of §§ 102 and 103." *Id.* at 593.

151. 618 F.2d at 768 ("Appellant's *claims*, however, are not limited to a unitary device in any sense.").

152. *Id.*

153. *Id.* at 769.

154. *Id.*

155. *Id.*

156. *Id.* at 771.

157. *Id.* at 769.

158. The CCPA had tried to put this to rest in an earlier opinion. *In re* Bradley, 600 F.2d 807, 811 (C.C.P.A. 1979) *aff'd mem. sub. nom.* Diamond v. Bradley, 450 U.S. 381 (1981). *Bradley* reviewed a PTO decision that concluded that any method of calculation was unpatentable, without regard to the preemption or transformation inquiries. As stated by the CCPA, "[s]uch reasoning leads to the conclusion that any computer-related invention must be regarded as mathematical in nature, a conclusion which is not compelled by either *Benson* or *Flook*." *Id.* at 811. The CCPA concluded that the claims in question were not

In sum, *Walter* represents a refinement of the second part of the *Freeman* test that is derived from the *Benson-Flook-Diehr* trilogy. After determining that the claims included steps that were mathematical representations of natural truth, the CCPA held that the scope of the claims could include the performance of the calculations by means other than the professed best mode computer.[159] Thus, by including manual, albeit tedious, calculation within its scope, the claims included human activity and were thus not patentable subject matter under the preemption inquiry.

C. The Freeman-Walter *Test*

Before the CCPA's decision in *Abele*, the test for software patentability in the *Freeman-Walter* test was derived from the *Benson-Flook-Diehr* trilogy. The test required an assessment of preemption of the claimed subject matter of possible parallel activity by non-electronic means of performing the algorithm, when an algorithm, equation, or formula formed a part of the claim.

The inquiry involves first an evaluation of whether the claimed steps that involve mathematics are representations of formulae, mathematical equations stating fundamental relationships, or scientific truths. If so, the second step in the test involves consideration of whether the function as claimed preempts non-electronic means of doing the same thing. As stated by the CCPA, "[w]e see no difference in this regard, with respect to being within § 101, between appellants' claimed invention and a strictly mechanical adding machine, which is certainly statutory *if claimed in a manner which does not embrace any particular calculation that the machine if capable of making*."[160] Finally, although the nature of a mathematical step virtually precludes reaching the question if input and output data are specified by the claim, the court must address whether there is in fact a transformation that has taken place or, alternatively, whether the claim merely seeks protection of an idea.

---

algorithms within the meaning of *Benson* and *Flook*. "Even though the claimed invention is a machine, we must nevertheless determine whether the claim recites a mathematical algorithm, and, if so, whether it preempts the use of the algorithm. . . . When we examine the appellants' invention as a whole under the first step of this test, . . . we fail to detect the presence of any *mathematical* algorithm." *Id.* at 813.

159. 618 F.2d at 768. The specification described a unitary device, a computer, as the best mode, but not the only mode.

160. *Bradley*, 600 F.2d at 812 (emphasis added).

IV. ABELE MODIFICATION: CONTEXT, PHYSICAL STEPS AND ENVIRONMENT

A. In re *Abele*

In *In re* Abele,[161] the CCPA had the opportunity to apply the test developed in *Freeman* and *Walter* in light of *Diehr*, which had recently been decided by the Supreme Court. *Diehr* represented, in light of the dissent by Justice Stevens, that computer software was patentable without the need for statutory amendment.

In *Abele*, the applicant sought patent protection for an improved method of performing computer tomography, the graphical depiction by computer of a map of the internal densities of a solid body. A map is created by irradiating the body with a beam of X-ray's aimed at the circumference of the body and detected at the opposite side. By comparing the transmission of each beam around the circle, and calculating the rates of penetration through the solid body, the computer maps the densities of the slice examined.[162]

The applicant's claims were initially rejected by the examiner based upon the PTO's interpretation of *Flook*, under which all steps in the claim requiring mathematical calculations were deemed prior art, and only the remainder of the claimed invention was to be assessed for patentability.[163] However, the PTO Board rejected the claims applying a different understanding of the *Freeman-Walter* test.

First, the Board concluded that, under *Freeman*, there was a claimed mathematical algorithm within the meaning of *Benson-Flook-Diehr*. Rather than evaluating preemption,[164] however, the Board turned to

---

161. 684 F.2d 902 (C.C.P.A. 1982).

162. *See id.* at 903-04. This feat is not possible without the processing speed and information storage volume of electronic computational equipment. Thus, any claim implicitly recites speed and accuracy limitations. A computer is able to use standard mathematics to solve a very large number of simultaneous equations with an equal number of unknown variables in a reasonable time frame. The invention in *Abele*, then, is representative of a more modern software-based patent application in which questions about the governing paradigm are raised because of the qualitative dissimilarity between "mental steps" (the parallel manual performance) paradigm and the claimed software function.

163. *See id.* at 904. This was the PTO argument rejected in *In re* Walter and *In re* Bradley. Under this analysis, the mathematical step could not be at the "point of novelty," the algorithm was mentally removed, and the residual portions of the claim were viewed for patentability and novelty.

164. Given the nature of the claimed invention, preemption would not have been a seriously contested issue.

Walter's explication of the *Flook* "transformation" requirement, and concluded that "the mathematical algorithm is not implemented in a manner to define structural relationships between physical elements in the apparatus claim or to refine and limit claim steps in the process claims."[165] As previously noted, however, neither *Benson*, *Flook*, nor *Walter* turned on whether the claims met the transformation requirement (which avoids the possibility of claiming an idea alone, rather than dealing with a preemption of human use of the idea). In all three, the court conceded that the mathematical algorithm at issue was more than an "idea" because there was a transformation, in the sense of *Cochrane v. Deener*.

On review, the CCPA addressed the first *Freeman* step and examined whether the mathematical components of the claimed inventions were versions of a natural law, descriptions of natural phenomena, or mirrored scientific formulae.[166] The CCPA concluded that "all of the claims may be directed to nonstatutory subject matter as each presents a mathematical formula or sequence of mathematical operations" within the meaning of *Benson*, and thus could be "directed to nonstatutory subject matter."[167] Addressing the next step, the CCPA questioned whether the second step, or "wholly preempted" test, from *Freeman* was still viable in light of *Flook*.[168] The CCPA concluded that *Flook* made "clear the second part of the above analysis was erroneous."[169] *Abele* then rephrased the second test as *either* whether the claim wholly preempted the algorithm *or* "would preempt the algorithm but for limiting its use to a particular technological environment."[170] The CCPA then turned to *Walter*'s dicta

---

165. *In re* Abele, 684 F.2d at 905.

166. *See id.* at 905 (citing *In re* Freeman, 573 F.2d 1237, 1245 (C.C.P.A. 1978)).

167. *Id.* at 907.

168. *See id.* at 905. *Walter* had already modified this aspect of *Freeman* in stating that "*Flook* does not require literal preemption of a mathematical algorithm found in a patent claim. The Court there stated that Flook's claims did not 'cover every conceivable application of the formula.'" *In re* Walter, 618 F.2d 758, 767 (C.C.P.A. 1980) (citation omitted).

169. *Abele*, 684 F.2d at 905-06.

170. *Id.* at 906. *Walter* arguably rejected a "but for" the context or environment analysis, stating:

> The claim preambles merely set forth the environment in which the improvement operates. They show only the context in which the mathematical exercises in the claims are to be used. In each claim, what is positively claimed, as distinguished from environment, is [the mathematical method of correlation]. . . . It remains a mathematical exercise even when verbally tied to the specific end use of seismic prospecting.

explaining the transformation requirement for a process as an identification of "structural relationships between the physical elements of the claim," and fashioned a new second test for assessing the patentability of computer software.[171]

In the new second step, after finding an algorithm, the court must study other aspects of the claim to find a substantial context, environment, or field of use that creates real and physical limitation on the scope of claim coverage. As stated by the court:

> However, the *Walter* analysis quoted above does not limit patentable subject matter only to claims in which structural relationships or process steps are defined, limited or refined by application of the algorithm. Rather, *Walter* should be read as requiring no more than that the algorithm, be "applied in any manner to physical elements or process steps," provided that its application is circumscribed by more than a field of use limitation or non-essential post-solution activity.[172]

In support of a requirement for a real and essential environment or field of use limitation, the CCPA noted that the rejected claims in *Walter* were construed to contain no substantive field of use limitation and

---

Walter, 618 F.2d at 769.

Flook more clearly rejected this analysis, Parker v. Flook, 437 U.S. 584, 593 (1978), as did *Diehr*, which stated that:

> A mathematical formula as such is not accorded the protection of our patent laws, Gottschalk v. Benson, 409 U.S. 63 (1972), and *this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.*

Diamond v. Diehr, 450 U.S. 175, 191 (1981) (emphasis added); *see also* Maier, *supra* note 101, at 156 (noting that the distinction between the "insignificant post-solution activity" in *Flook* and the claim in *Diehr* to actual transformation "to a different state or thing . . . is questionable in technical terms").

171. *Abele*, 684 F.2d at 906. *Meyer* suggests that interchanging the "transformation" and "preemption" inquiries may have been purposeful. After quoting the preemption inquiry from *Walter*, the CCPA in *Meyer* notes that "[t]he above statement from *Walter* complements prior statements by the Supreme Court, but, as with those statements, it was not intended to be the exclusive test for determining the presence of statutory subject matter" and then cites the transformation requirement from *Benson*. *In re* Meyer, 688 F.2d 789, 796 & n.5 (C.C.P.A. 1982).

172. *Abele*, 684 F.2d at 907.

"were, therefore, directed to non-statutory subject matter."[173] The CCPA held that, under this reformulated second step of the *Freeman-Walter* inquiry, some of the *Abele* claims were limited to the specific invented embodiment, and others were not.

Particularly, claim five was "directed solely to the mathematical algorithm portion of appellants' invention and was not statutory subject matter under § 101."[174] In contrast, claim six contained an X-ray attenuation data receipt limitation, which meant that the claim covered the algorithm "[o]nly after these steps have been completed," and was thus patentable,[175] because "the algorithm is but a part of the overall claimed process."[176] To be patentable, in sum, the "algorithm is []either explicitly []or implicitly applied to any certain process."[177] The court concluded that it simply faced "an improved CAT-scan process comparable to the improved process for curing synthetic rubber in *Diehr* . . . . The improvement in either case resides in the application of a mathematical formula within the context of a process which encompasses significantly more than the algorithm alone."[178]

---

173. *See id.*

174. *Id.* at 908.

175. *Id.*

176. *Id.* at 909.

177. *See id.*

178. *Id.* In analyzing the claimed context or environment as creating real limitations, the court may not have fully understood the phrase "X-ray attenuation data" in the claim. The court treated this aspect of the claim as referring to a specific novel feature. The novel feature of the invention was averaging routine X-ray attenuation for a particular penetration into similar attenuation in the immediate vicinity to derive an average signal. The comparing and averaging activity is present in another portion of the claim. The specific language cited by the court as creating a finite context and defined input upon which the algorithm operated was, thus, the same X-ray attenuation data that was used by prior art CAT-scans.

The result is that, despite the prohibition against looking to whether there was pre-solution or post-solution physical activity to determine patentability, the court found patentability based on an "old" pre-solution physical activity on which the novel algorithm operated. In short, the court never evaluated the claims based on the added value of computerization or whether there was preemption of non-computerized identical, parallel, or duplicate activity. As stated by the court, in considering a claim found to be patentable:

> The method of claim 6, unlike that of claim 5, requires "X-ray attenuation data." The specification indicates that such attenuation data is available only when an X-ray beam is produced by a CAT scanner, passed through an object, and detected upon its exit. Only after these steps have been completed is the algorithm performed, and the resultant modified data is displayed in the required format.

Id. at 908.

The court relied, in this claim, on *pre-solution* physical activity, the radiation generation

The new second step, with its focus on the physical environment in which the program operated, created the later-realized risk that patentability would be a function of claim steps that describe particular physical aspects of the invention rather than focusing on the benefit of the software itself. The analysis adopted by the Federal Circuit looks to "*what* the computer does [rather than] *how* it is done."[179] The advantage is that the court can evaluate the function rather than the details of the specific implementation of the software (for example, the source code, the amount of memory employed, the speed at which a particular function is performed, the use of traditional software steps or units of function, etc.). Evaluating the function in a contextual framework of real-world activity is far easier than delving into such technical specifications.[180] A novel function can be implemented by many differing, and separately patentable, software structures. Analysis of function without assessment of software structure is also a disadvantage, however, because the second step crafted in *Abele*, apparently out of whole cloth, precludes examination of the novel aspects of the structure of the software itself. By failing to look at how the software has accomplished the result or physical manifestation, the court has precluded protection, through the patent system, of the elements unique to new, useful, and inventive software.

---

component of a routine pre-invention CAT scanner, to find patentable subject matter. The court stated that "[i]t is these antecedent steps that dictate what type of data must be obtained" and these "data gathering steps [are] not dictated by the algorithm." *Id.* In sum, a claim limitation to a specific physical environmental context found in all CAT scanners and a form of pre-solution activity made the claims patentable subject matter. This result would seem untenable in light of *Flook* unless the timing of the activity was of some significance. The claim in *Flook* required "adjusting said alarm limit to said updated alarm limit value," Parker v. Flook, 437 U.S. 584, 597 (1978), where the alarm limit was manifestly indicated by claim and specification to be a physical parameter in the catalytic conversion of petrochemicals.

In *Abele*, the defense of use of pre-solution activity rests on the fact that the invention in *Flook* did not explain how to select the input variables on which the algorithm operated, unlike, presumably, *Abele*, where the input variables to the algorithm were explained as derived from the physical nature of the body through which X-rays were passed. The court stated that,"[i]n the instant case, claim 6 defines the variables and places the algorithm in a particular relationship to a series of steps in a particular type of process, permitting the algorithm to be applied as a further process step." *Id.* at 908. In both *Flook* and *Abele*, the variables on which the algorithm operated were dictated by prior art technology. The other possible explanation is that the court viewed the pre-solution input data, the X-ray attenuation data, as part of the novelty of the claimed invention.

179. *See In re* Bradley, 600 F.2d 807, 811 (C.C.P.A. 1979); *see also id.* at 812 ("But this is only *how* the computer does what it does. Of importance is the significance of the data and their manipulation in the real world, i.e., *what* the computer is doing.").

180. *See, e.g.*, Stern, *supra* note 6, at 375 (1991) (contending that PTO "concededly was ill-equipped" to look at novelty or obviousness of software itself).

B. Application in Meyer *and* Pardo

Meyer[181] and *Pardo*[182] form the final elucidation of the CCPA's two-part test of software patentability before the creation of the Federal Circuit. They illustrate the application of the test as modified by *Abele*. *Meyer* concerned a software program that, in one embodiment, evaluated clinical data derived from a neurologic examination of a patient, and then converted that data into probabilistic assessments of potentially non-functioning neural tissue in the patient. As such, the claim risked providing preemptive exclusive rights by "replacing, in part, the thinking processes of a neurologist"[183] unless the claims were restricted to some aspect of software-added value, such as time, speed, or number of evaluations in a particular time period, which they were not. However, the CCPA did not evaluate possible preemption.[184]

First, the CCPA assessed, under the first arm of *Freeman*, whether the claimed invention represented "mathematical algorithms and formulae" or "ideas or mental processes."[185] The court noted that "[t]he presence of a mathematical algorithm or formula in a claim is merely an indication that a scientific principle, law of nature, idea or mental process *may* be the subject matter claimed and, thus, justify a rejection of that claim under 35 U.S.C. § 101; but the presence of a mathematical algorithm or formula is only a signpost for further analysis."[186] In this case, the appellant conceded that the claims recited a mathematical algorithm in the sense of *Benson-Flook-Diehr*.[187] The CCPA turned to the second step, as set forth in *Abele*:

> Thus, the decisive question is whether that mental process

---

181. *In re* Meyer, 688 F.2d 789 (C.C.P.A. 1982).

182. *In re* Pardo, 684 F.2d 912 (C.C.P.A. 1982).

183. 688 F.2d at 795.

184. Bruzga suggests a comparable overbreadth analysis of the claims in *Meyer* directed at the same principle that the scope of the claims far exceeded what the applicant sought. "The claims are broad in scope in that they cover virtually any 'complex system' without regard to whether such systems have been fully analyzed and developed in such a way that a person of ordinary skill in the art could perform the claimed steps . . . . Thus, the scope of the enabling disclosure in *In re Meyer* is likely to be vastly superseded by the scope of the claims." Bruzga, *supra* note 8, at 215. Under the suggested preemption doctrine enunciated in *Benson-Flook-Diehr*, the claims are broad enough to cover physician diagnostic activity.

185. 688 F.2d at 794.

186. *Id.* at 795.

187. *See id.*

> is applied to physical elements or process steps in an otherwise statutory process, machine, manufacture, or composition of matter, in accordance with 35 U.S.C. § 101. Although the second of the two-part test of *In re Freeman* is whether a scientific principle, law of nature, idea or mental process (represented by a mathematical algorithm or formula) is preempted by the claim, this court, in *In re Walter* . . . modified *Freeman* to require that a positive approach be taken to determine what, as a whole is claimed.[188]

Under the positive approach, the transformation inquiry, the CCPA concluded:

> On this basis, we conclude that appellants' independent claims are to a mathematical algorithm representing a mental process that has *not* been applied to physical elements or process steps and is, therefore, not limited to any otherwise statutory process, machine, manufacture, or composition of matter.[189]

In short, the CCPA recast step two into a physical environment or context limitation, contrary to the holding in *Flook*. Given the absence of further Supreme Court analysis, this has remained the law.

In *Pardo*, the CCPA also explored the new "physical steps" inquiry as modified by *Abele*, although the claims at hand did not require reaching the second step. *Pardo*'s holding turns on the conclusion by the CCPA that the claims were not to a mathematical algorithm within the meaning of *Benson-Flook-Diehr* as stated in the first step of the *Freeman-Walter* test.[190] However, the court stated the second step as:

> Next, if a mathematical algorithm is found, the claim as a whole is analyzed to determine whether the algorithm is "applied in any manner to physical elements or process steps," and, if it is, it "passes muster under § 101."[191]

---

188. *Id.* at 795-96 (citations omitted).
189. *Id.*
190. *In re* Pardo, 684 F.2d 912, 915-16 (C.C.P.A. 1982).
191. *Id.*

After *Abele*, preemption by claimed software, per both *Benson* and *Flook*, is not a consideration. Rather, the second step, after finding an attempt to claim a fundamental algorithm, is to ask whether the claim has applied the algorithm in a sufficiently specific fashion to constitute a "process" involving actual physical transformation. Since transformation was never an issue in either *Flook* or *Benson*, the new two-part test constitutes a misreading of Supreme Court precedent that is justified only if *Diehr* changed the law expressed by *Flook*.

Further, the current inquiry abjures consideration of the software itself, as shown by the steps, the method, or the actual encoding, and looks only at whether the software accomplishes something in the physical environment.[192] This narrow view of patentability has led the marketplace to seek copyright protection, rather than patent protection, to ensure property rights in new and original software that accomplishes the same task as old software, but does it better.[193]

---

192. *See* Maier, *supra* note 101, at 158 ("The mode of expression embodied in the code that comprises the software is not specifically protected by patent, but the basic organization of the software and the manner in which it operates are in principle protectable by patent—assuming all other standard requirements for patentability are met.").

193. *See, e.g.*, Atari Games Corp. v. Nintendo of Am. Inc., No. 91-1293 (Fed. Cir. Sept. 10, 1992); Computer Assocs. Int'l Inc. v. Altai Inc., 955 F.2d 544 (2d Cir. 1992) (holding that the nonliteral elements of the operating system compatibility component of a program were not substantially similar to the copyrighted materials to be deemed an infringement); Vault Corp. v. Quaid Software Ltd., 847 F.2d 255 (5th Cir. 1988) (ruling that designing a program to defeat the copy protection scheme created by the plaintiff's program was not an infringement of the plaintiff's exclusive right to reproduce its program, did not constitute contributory infringement, and was not a derivative work, and that the prohibition on decompilation of the plaintiff's program was unenforceable); Whelan Assocs. Inc. v. Jaslow Dental Lab. Inc., 797 F.2d 1222 (3d Cir. 1986) (holding that copyright protection of computer programs could reach beyond a program's literal code to its structure and organization, and that infringement determination depends on the substantial similarity between the programs), *cert. denied*, 479 U.S. 1031 (1987); Apple Computer, Inc. v. Formula Int'l Inc., 725 F.2d 521 (9th Cir. 1984) (affirming the lower court's grant of an injunction against the defendant to prevent copying or distributing computer programs copyrighted by the plaintiff and to prevent use of the trademark "Pineapple" on its products); Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240 (3d Cir. 1983) (affirming the lower court's grant of a preliminary injunction against the defendant from copying object or source code from programs and operating systems because of potential irreparable harm to the plaintiff's investment and competitive position); Lotus Dev. Corp. v. Paperback Software Int'l, 740 F. Supp. 37 (D. Mass. 1990) (holding that the menu structure and screen presentation of a computer spreadsheet program were copyrightable, and duplication of these features constituted an infringement).

V. FEDERAL CIRCUIT: *GRAMS* VERSUS *IWAHASHI*

A. In Re *Grams*

In *In re* Grams,[194] the Federal Circuit considered a claim to a system for first evaluating diagnostic tests performed on a patient and then identifying the most probable abnormal condition.[195] The PTO rejected the claims as being directed to nonstatutory subject matter because the claims were in essence either a mathematical algorithm or a method of doing business.[196] The inventors conceded that the claim "includes a mathematical algorithm," thus passing the first step in the *Abele* test for software patentability.[197] The question then was whether the inventors complied with the second step, because "the inclusion of a mathematical algorithm can render it nonstatutory if the claim in essence covers only the algorithm."[198]

If there were any remaining doubts as to the vitality of the preemption test over an analysis of the claim as a whole for the presence of transforming physical steps, such doubt was removed by *Grams*, in which the Federal Circuit repeatedly cites the need for some aspect of the claimed invention to place the software in a physical environment or context that accomplishes a result. As stated by the Federal Circuit, "[i]f there are physical steps included in addition to the algorithm, the claim might be eligible for patent protection."[199] The court recognized the difficulty in assessing whether the claimed invention, in light of the supporting disclosure, had sufficient physical steps *in the other non-mathematical steps*, but decided that "[i]t is facilitated somewhat if, as here, the only physical step involves merely gathering data for the algorithm."[200] The Federal Circuit concluded that with their absence of

---

194. 888 F.2d 835 (Fed. Cir. 1989).

195. *See id.* at 836-37. As reprinted the claims clearly "preempt" a physician's analysis of the same results and thus flunk the preemption test.

196. *See id.* at 836.

197. *See id.* at 837.

198. *Id.* This is a restatement of the environment or "transformation" requirement of *Abele*. Interestingly, the preemption inquiry, in this example, would be the converse, i.e., whether the algorithm is covered by the claim sufficiently that other use of the algorithm would be within the claim scope.

199. *Id.* at 838.

200. *Id.* at 839.

detail on the tests to be performed and the general application of the algorithm to all kinds of complex systems, "the applicants are, in essence, claiming the mathematical algorithm, which they cannot do under *Gottschalk v. Benson*. The presence of a physical step in the claim to derive data for the algorithm will not render the claim statutory."[201] In short, the patentability of software does not turn on the structure and nature of the software, and the only question is whether the particular claimed physical environment or context is substantial enough. As stated by the court:

> In this case, because algorithm steps [b]-[e] do not operate to change any aspect of the physical process of step [a], the claim does not satisfy the *Walter* guideline. Though this by itself is not dispositive . . . patentability here is precluded by the fact that physical step [a] merely provides data for the algorithm.[202]

No attention in the patentability analysis is given to the means by which the software achieves its goal or whether those means preempt human thought. The statutory process requirement, that an entity "be transformed and reduced to a different state or thing,"[203] which was satisfied by merely updating an alarm limit in *Flook*, has been modified into a requirement for real and substantial transformation apart from the algorithm, or software, parts of the claim.

B. In Re *Iwahashi*

In re Iwahashi[204] is the first software patent opinion to discuss explicitly the asserted advantages of a claimed invention in terms of the standard software paradigm. The court refers to such added value concepts as "simple circuitry without the need for an expensive multiplier,"[205] "high accuracy,"[206] "high speed,"[207] and still recognizes that

---

201. *Id.* at 840.
202. *Id.*
203. Cochrane v. Deener, 94 U.S. 780, 788 (1876) (holding that a process is patentable independent of the machinery used in the process).
204. 888 F.2d 1370 (Fed. Cir. 1989) (stating that whether a claim includes or is directed to an algorithm is not a ground for holding that the claim is directed to nonstatutory subject matter).
205. *Id.* at 1371.
206. *Id.* at 1372.

software may simply duplicate human functions, stating that the invention before it "is the electronic equivalent of a table in which one can look up the square of numbers over a desired range."[208] The invention claimed was an improved electronic auto-correlation unit that stored signal samples for use in voice recognition. The PTO rejected the claims as directed to non-statutory subject matter.

Under the *Freeman-Walter* test, the court stated that the first inquiry was whether the claims were drawn to a mathematical algorithm within the meaning of *Benson-Flook-Diehr*.[209] Here, the inventors conceded that their claim recited an algorithm in at least some manner.[210] The court then turned to a secondary analysis of the structural relationships between the physical elements or refinements and limitations present in the non-mathematic steps of the claim, citing the *Walter* conception of the transformation requirement. In *Iwahashi*, the court held that the claims, recited in means-plus-function terminology that required reference to the specification, were drawn with "specific structural limitations."[211] The court, therefore, held that limitations inherent in the claims by operation of § 112 ¶ 6[212] created sufficient basis to find that the claims were drafted to an "apparatus in the form of a combination of interrelated means."[213]

As can be seen from the above resolution, the subject matter patentability test focuses on the structural or environmental limitations present in the non-mathematic portions of the claims. When those limitations are sufficient and substantial, even a software claim that contains mathematical equations may be patentable. The software itself is not analyzed to determine whether the claimed steps cover, duplicate, or preempt human thought or operation by "hand, head, and pencil." Finally, the component steps of software programs are not relevant in the examination of patentable subject matter.

---

207. *Id.*
208. *Id.*
209. *See id.* at 1374.
210. *See id.* at 1374-75.
211. *See id.* at 1375.
212. Paragraph six of 35 U.S.C. § 112 states that claims in means-plus-function terms "shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof," and requires importation of structural limitations from the specification into the claims when none are apparent from the language of the claims themselves. Laitram Corp. v. Rexnord, Inc., 939 F.2d 1533 (Fed. Cir. 1991) (observing that § 112 ¶ 6 differentiates structures by more than mere function).
213. *See Iwahashi*, 888 F.2d at 1375.

C. Majority Opinion in Arrhythmia

Arrhythmia[214] involved a patent asserted against an alleged infringer that was found invalid for failure to claim statutory subject matter under § 101.[215] The claims covered a diagnostic test applied to normal post-myocardial infarction cardiac electrical activity data. The test detected an increased likelihood of abnormal spontaneous ectopic cardiac electrical activity based upon identification of an anomalous late potential.[216] Detection of these late potentials requires measurement of electrical activity during about one-tenth of a second.[217] As stated by the patent owner, "the claims are directed to a process and apparatus for detecting and analyzing a specific heart activity signal, and do not preempt the mathematic algorithms used in any of the procedures."[218]

After reviewing the *Benson-Flook-Diehr* trilogy and the *Freeman-Walter-Abele* two-step test, the court described the appropriate inquiry:

> It is first determined whether a mathematical algorithm is recited directly or indirectly in the claim. If so, it is next determined whether the claimed invention as a whole is no more than the algorithm itself; that is, whether the claim is directed to a mathematical algorithm that is not applied to or

---

214. Arrhythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053 (Fed. Cir. 1992).

215. *Id.* at 1054.

216. *Id.*

217. *Id.* at 1054 n.2. Were the preemption test of remaining viability, a question would arise as to whether this time limitation required the use of high speed computing power to detect the anomalous late potential. Otherwise, the method of detection developed by Dr. Simson, the inventor, could well be applied manually through head, hand, and calipers. As stated by the court, "the Simson invention is properly viewed as an electrocardiograph analysis process." *Id.* at 1059. Generally, such analysis can be performed manually once the requisite criteria are known. The court did state, later in the opinion, that "Simson's claimed function could not have been performed effectively without the speed and capability of electronic devices and components." *Id.* at 1060. Under the preemption inquiry, this fact, if corroborated by claim limitation, would have permitted patentability, but the court here states that this fact is not determinative of patentability. Thus, the preemption test has been discarded.

218. *Id.* at 1058. Under the forgotten preemption inquiry, to which this assertion is directed, the question would be whether the diagnostic test developed by Dr. Simson, and the consequent mathematical analysis and breakdown of the cardiac electrical activity by a computer, was a just description of a phenomenon of nature, albeit discovered by Dr. Simson. That is, are the particular potentials that Dr. Simson identified a feature of cardiac excitability in the post-infarction period? If so, then a test that relies on merely identifying the natural feature, and preempts anyone else from identifying it (even without the claimed computer), acquires property rights over the discovery of a natural event.

> limited by physical elements or process steps. Such claims are nonstatutory. However, when the mathematical algorithm is applied in one or more steps of an otherwise statutory process claim, or one or more elements of an otherwise statutory apparatus claim, the requirements of section 101 are met.[219]

The court accepted the proposition that a mathematical algorithm was included in the process claims and proceeded to determine whether the claimed process was nevertheless statutory.[220] This latter step required determining "what the claimed steps do, independent of how they are implemented."[221] The court concluded that the input signals and the outputs of the program were not "abstractions," but were "related to the patient's heart function." Further, the "claimed steps of 'converting', 'applying', 'determining', and 'comparing'" these signals "are physical process steps that transform one physical electrical signal into another."[222] Thus, the *Freeman-Walter-Abele* standard for the process claims was successfully applied.[223]

D. PTO Report

In 1989, the PTO prepared and published an analysis of "whether mathematical algorithms and computer programs are statutory subject matter."[224] The report notes that only certain mathematical algorithms are unpatentable. In assessing this question, the report cites the two-part test in *Freeman* as derived from *Benson*. The first step considers whether the claim is drawn to "[m]athematical algorithms [that] represent scientific principles, laws of nature, or ideas or mental processes for solving complex problems," which may include "algorithms invented by man."[225] The report states that, after *Flook*, the CCPA in *Walter* "modified the second step of *Freeman* to require a more positive approach to determin-

---

219. *Id.*
220. *See id.* at 1059.
221. *Id.*
222. *Id.*
223. *See id.* For the apparatus claims, the court relied on the fact that the means-plus-function language incorporated the "internal structure of the computer" limitations from the specification, citing *In re* Iwahashi, 888 F.2d 1370, 1375 (Fed. Cir. 1989).
224. Lee & Barrett, *supra* note 2 at 564 (analysis conducted within the Office of the Solicitor of the PTO).
225. *Id.* at 565-66.

ing what is claimed."[226] The PTO report then cites the language in *Walter* concerning "structural relationships between the physical elements of the claim" and concludes that, "while the second step of *Freeman* was 'sated [sic] in terms of preemption' it had consistently been applied 'in the spirit of the foregoing principles.'"[227] The PTO report thus both documents and affirms the shift away from preemption seen in *Walter* and *Abele*.

The new test identifies whether "the algorithm is 'applied in any manner to physical element or process steps' [that] may be made by viewing the claims without the algorithm and determining whether what remains is 'otherwise statutory.'"[228] The PTO report advises that the "guideline" should be "to view the claim without the mathematical algorithm to determine whether what remains is 'otherwise statutory'; if it is, it does not become nonstatutory simply because it uses a mathematical algorithm."[229]

In providing further guidance, the report notes that "insignificant or non-essential" physical activity may not save the asserted claim. Additionally, field of use limitations, when in the preamble, are insufficient to make the process statutory. The PTO states that this advice is consistent with "the usual treatment of preambles as merely setting forth the environment."[230]

The report notes conflict in the precedent with regard to "data gathering" steps. In *Abele*, data gathering steps were sufficient because the data were not dictated by the algorithm.[231] Finally, the report notes that when there are transformations "from one physical state to a different physical state," or structural limitations in process claims, the claims are more likely to be found patentable subject matter.[232]

In sum, then, the PTO report reiterates the conclusion stated above,

---

226. *Id.* at 564.

227. *Id.* at 565.

228. *Id.* (citing *In re* Abele, 684 F.2d 902, 909 (C.C.P.A. 1982)).

229. *Id.* at 567.

230. *Id.*

231. *Id.* at 568 (citing *Abele*, 684 F.2d at 908). Note that, technically, pre-solution data gathering cannot be dictated by the algorithm, in the sense of a mathematical solution, but the post-solution data are always dictated by the operation of the algorithm. *But see* Parker v. Flook, 437 U.S. 584 (1978) (holding that mere post-solution application suggestions attached to a mathematical algorithm do not qualify as patentable subject matter); *In re* Richman 563 F.2d 1026 (C.C.P.A. 1977) (stating that novel pre-solution data acquisition methods attached to mathematical formulae were non-statutory subject matter).

232. Barret, *supra* note 2, at 568; *see also* Gable & Leaheey, *supra* note 115, at 107 (PTO guidelines encourage patent drafter to recite clearly a transformation).

which is that software patentability depends on the components of the claim aside from the mathematical algorithm having some physical limitation.[233]

E. Conclusion

The software patentability test evolved by the CCPA and the Federal Circuit involves a step-wise inquiry into the claimed invention. First, the claims must be examined to determine if they include a mathematical step that states a fundamental natural, physical, or chemical relationship. If so, then the claim contains an "algorithm" within the meaning of *Benson*. The presence of such an algorithm requires further examination of the claimed steps to certify that the claim is not limited to the algorithm. To remain patentable, the claim must contain physical steps or environmental limitations that would be patentable subject matter.[234] Those extra steps must be substantial and essential to the claimed invention to preclude expert draftsmen from avoiding the prohibition on patenting an algorithm. In addition, the algorithm cannot be determinative of data that are entered into the equation, and some physical result must be achieved by the computation itself. Relevant examples include X-ray attenuation information that is part of a normal machine, electrical signals representing cardiac activity, and electronic signals that represent voice analysis. The results of blood tests that were not a substantial part of the claimed invention were not in a sufficiently specific input data form to permit patentability when the claims contained no real limitation as to specific tests.

---

233. Gable and Leaheey argue that providing an "electrical signal" as the physically transformed entity expressly in the claim would permit patentability of virtually all software. *Supra* note 115, at 131-35. This may be the meaning behind the Supreme Court's concept of "expert draftsmen."

234. *See* Stern, *supra* note 6, at 395 (Patentable software should have "[(a)] use or field-of-use limitations to a technological art, and (b) some hardware (at the very least, nominal hardware) adapted to the given use."); Gable & Leaheey, *supra* note 115, at 98 ("the second step requires an analysis of the claim language to determine the relationship between the recited mathematical algorithm and *all other* steps or elements of the claim" (emphasis added)).

VI. *ARRHYTHMIA* CONCURRENCE AND CONCLUSION

The concurrence in *Arrhythmia*[235] represents a new methodology in the determination of software patentability that has, up until now, precluded analysis of the software itself. In addition, the current two-part analysis for patentability applied by the Supreme Court, together with the tendency of Judge Rich to identify patentability in new and inventive software, represents an opportunity to readdress the fundamental questions regarding software patentability determination.

A. Arrhythmia *Concurrence*

Judge Rader's concurrence suggests that the Federal Circuit may be willing to readdress the conditions of software patentability. If so, current software has advanced sufficiently beyond the level of sophistication at issue in *Benson* that a return to preemption consideration may no longer be a viable legal construct. Further, such a reanalysis will result in the rejection of the environment, context, or transformation requirement placed into case law by *Abele* through a misreading of *Walter*. Judge Rader states that for the electrocardiographic reading machine of the claimed invention:

> While many steps in the '459 process involve mathematical manipulation of data, the claims do not describe a law of nature or a natural phenomenon. Furthermore, the claims do not disclose mere abstract ideas, but a practical and potentially life-saving process. Regardless of whether performed by a computer, these steps comprise a "process" within the meaning of section 101.[236]

Judge Rader then suggests that the algorithm rule itself is based on a misperception that algorithms, used by computers, represent natural laws.[237] He argues:

---

235. Arrihythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053, 1061-66 (Fed. Cir. 1992) (Rader, J., concurring).

236. *See id.* at 1065-66.

237. *Id.* at 1066. Although the specific algorithm at issue in *Benson* could be said to represent a statement of mathematic truth.

> A law of nature is indeed not patentable, but for reasons unrelated to the meaning of "process." A law of nature, even if a process, is not "new" within the meaning of § 101. Moreover, in *Sarker*, this court's predecessor gave another reason a law of nature cannot satisfy section 101. *In re Sarker*, 588 F.2d 1330, 1333, 200 U.S.P.Q. 132, 137 (C.C.P.A. 1978). In sum, the Patent Act excludes laws of nature from patent protection, even without a strained explanation excluding laws from the meaning of "process." It is difficult to determine how or why mathematical algorithms are "like" laws of nature.[238]

Judge Rader concludes that, "when all else fails (and the algorithm rule clearly has), consult the statute."[239]

B. Discussion

This Article comes to the same conclusion. The algorithm rule must either be changed to conform to its original scope (related to preemption) or removed from software patentability jurisprudence altogether. This Article contends that the fault, however, is not in *Benson*, which confronted an attempt to claim a method of doing business by making base-two conversions (an art as old as ancient Arabian mathematics) the subject of a patent. *Benson* correctly states that a claim of such broad scope encompasses thought or business transactions, albeit the business of mathematicians, and cannot be patented. That rule, however, has little to do with the rule evolved in *Abele*, which predicates patentability on the environment in which the claimed "thought" is occurring. The problem is not the environment of the claimed software steps, but whether the claim description of how the software functions includes not only the operation of the invented computer program, but also human thought. That was the problem confronted in, and the holding of, *Benson*. A return to the concept of examining for preemption of human business transactions and thought would not be difficult. Indeed, faithfulness to Supreme Court jurisprudence requires it.[240]

---

238. *Id.* at 1066 n.3.

239. *Id.* at 1066.

240. Recent case law suggests that prior Federal Circuit panel opinions and CCPA precedent may not be binding on the court when the precedent exceeds the scope of

Under current CCPA and Federal Circuit jurisprudence, "[f]or a process claim involving a mathematical algorithm to be patentable, the claim excluding the algorithm is required to be statutory subject matter."[241] Under this existing regime, experts estimate that less than one percent of software programs are likely to contain a patentable computer process.[242] Copyright, with its dichotomy between unprotectable ideas and protectable expression, is not a suitable alternative for the protection of computer software.[243] Instead, the main protective measure of new software programming technology has been trade secrets.[244] One of the principles underlying patent protection, and its benefits for the average person and the nation, is that obtaining a patent requires full disclosure of the invention to the public in a manner that is both accessible and reproducible.[245] This benefit is lost when software is protected under either trade secret law or copyright.[246] In fact, stretching copyright to fill a gap better filled by reassessment of the *Benson-Flook-Diehr* preemption rule results in needless distortion and conflict in copyright laws.[247] The final irony is that a policy initially borne from the PTO's inability to examine patent applications because of inadequate library resources[248] has

---

Supreme Court precedent. *See* Atlantic Thermoplastics Co. v. Faytex Corp., 970 F.2d 834 (Fed. Cir. 1992).

241. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 8 n.15.

242. *Id.* at 21 n.21. In comments to Congress, examiners from the PTO contended that the phrase "software patent" is a misnomer because the computer program itself was unpatentable as "opposed to the underlying processes they carry out." *Id.* at 2 n.6; *see also* Michael J. Kline, *Requiring an Election of Protection for Patentable/Copyrightable Computer Programs (Part I)*, 67 J. PAT. OFF. SOC'Y 280, 303 (1985) ("Only a small fraction of all computer programs written will qualify for patent protection, perhaps fewer than one percent.").

243. *See* Chisum, *supra* note 6, at 1020 ("Copyright . . . [is] inherently less suited to the protection of new technological ideas with widespread potential uses."); Gable & Leaheey, *supra* note 115, at 89 ("Ideas, procedures, processes, systems or control function underlying computer programs are precluded by statute from copyright protection."); Friedland, *supra* note 6, at 541-47; Simenauer, *supra* note 29, at 876 ("Copyrights, however, afford computer programs only limited protection. A copyright protects only the expression of an idea, not the idea itself. . . . Because of these limitations, copyrights do not adequately protect programs employed on computer-related inventions.").

244. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 9 nn. 17, 22; Gable & Leaheey, *supra* note 29.

245. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 2; Simenauer, *supra* note 29, at 878-79 ("Keeping a particular technology secret deprives the public of useful information for an indefinite period of time, which tends to stifle technological advancement in related arts.").

246. "Copyrighted software deposited at the Copyright Office is not readily searchable for patent purposes." OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 9 n.17.

247. *See, e.g.*, *supra* note 193.

248. *See* PRESIDENT'S COMM'N ON THE PATENT SYS., *supra* note 11, at 13 (The report

resulted in an inadequate library resource of computer software for the nation as a whole.[249] As noted by the Office of Technology Assessment:

> Because the bulk of software continues to be protected by copyright and/or trade secret, because much of the history of software development is not in the published literature, and because relatively few patents for software-related inventions were granted prior to the 1980s, the available and locatable prior art is less complete and relatively more difficult to compile or search than the prior art for other technical fields.[250]

The time has come to commit ourselves to developing reference resources, permitting software patentability, and allowing the patent system to help foster technological change.

---

contends that the PTO does not have the wherewithal or resources to examine software patents and that Title 35 should be amended to exclude software from patentability.).

249. *See* Stern, *supra* note 6, at 384 ("The poor documentation and indexing of computer art, of course, makes rejection on the basis of prior art difficult or even infeasible."); Antton & Feitshans, *supra* note 30, at 897 ("If a patent application that cannot be classified is one that the PTO cannot examine, then one way of defining patentable subject matter under 35 U.S.C. § 101 is by whether the PTO can classify the claimed invention.").

250. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 22.