888 F.2d 835 (1989)

In re Ralph R. GRAMS and Dennis C. Lezotte.

No. 89-1321.

United States Court of Appeals, Federal Circuit.

November 3, 1989.

836   *836 William L. Feeney, Kerkam, Stowell, Kondracki & Clarke, P.C., of Falls Church, Va., submitted for appellant. With him on the brief was Dennis P. Clarke.

Lee E. Barrett, Associate Sol., Office of the Sol., Arlington, Va., submitted for appellee. With him on the brief was Fred E. McKelvey, Sol.

Before ARCHER and MICHEL, Circuit Judges, and COWEN, Senior Circuit Judge.

ARCHER, Circuit Judge.

Applicants Ralph A. Grams and Dennis C. Lezotte (Grams) appeal from the decision of the Board of Patent Appeals and Interferences (Board), United States Patent and Trademark Office, Appeal No. 88-1391 (December 28, 1988), affirming the examiner's rejection of claims 1 and 3-16, which constitute all the claims remaining in Application S.N. 625,247, filed June 27, 1984. The claims were rejected under 35 U.S.C. § 101 as being directed to nonstatutory subject matter because they in essence claim either a mathematical algorithm or a method of doing business. We affirm.

BACKGROUND

The invention provides a method of testing a complex system to determine whether the system condition is normal or abnormal and, if it is abnormal, to determine the cause of the abnormality. As disclosed in the specification, the invention is applicable to any complex system, whether it be electrical, mechanical, chemical, biological, or combinations thereof. The system comprises a plurality of constituent subsystems or parts, some characteristic of which is represented by a set of correlated parameters susceptible of measurement and representative of the overall system. The disclosed invention involves considering the entire set of parameters, diagnosing the existence of an abnormality, and identifying which particular parameters of the set are responsible for the abnormality.

The claims limit the disclosed invention to the diagnosis of an individual. Claim 1, on which the other claims depend, reads:

837   1. A method of diagnosing an abnormal condition in an individual, the individual being
                characterized by a plurality of correlated parameters of a set of such parameters that is
                representative of the individual's condition, the parameters comprising data resulting from a
                plurality of clinical laboratory tests which measure the levels of chemical and biological constituents
                of the individaul [sic] and each parameter having a reference range of values, *the method
                comprising* [a] performing said plurality of clinical laboratory tests on the individual to measure the
                values of the set of parameters; [b] producing from the set of measured parameter values and the
                reference ranges of values a first quantity representative of the condition of the individual; [c]
                comparing the first quantity to a first predetermined value to determine whether the individual's
                condition is abnormal; [d] upon determining from said comparing that the individual's condition is
                abnormal, successively testing a plurality of different combinations of the constituents of the
                individual by eliminating parameters from the set to form subsets corresponding to said

combinations, producing *837 for each subset a second quantity, and comparing said second quantity with a second predetermined value to detect a non-significant deviation from a normal condition; and [e] identifying as a result of said testing a complementary subset of parameters corresponding to a combination of constituents responsible for the abnormal condition, said complementary subset comprising the parameters eliminated from the set so as to produce a subset having said non-significant deviation from a normal condition.

(Emphasis and bracketed letters added.) Thus, step [a] requires the performance of clinical laboratory tests on an individual to obtain data for the parameters (*e.g.,* sodium content). The remaining steps, [b]-[e], analyze that data to ascertain the existence and identity of an abnormality, and possible causes thereof. In that regard, steps [b]-[e] are in essence a mathematical algorithm, in that they represent "[a] procedure for solving a given type of mathematical problem." *Gottschalk v. Benson,* 409 U.S. 63, 65, 93 S.Ct. 253, 254, 34 L.Ed.2d 273 (1972).[1]

Applicants do not dispute that claim 1 includes a mathematical algorithm. However, they contend that the mere recital of an algorithm does not automatically render a claim nonstatutory. They are correct in that regard, but the inclusion of a mathematical algorithm in a claim can render it nonstatutory if the claim in essence covers only the algorithm. The Board held that was the case here.

ISSUE

Whether the algorithm-containing claims at issue are drawn to statutory subject matter.

OPINION

Section 101 of Title 35 states:

> 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.

(Emphasis added.) Intuitively, one might conclude that the statute's "any ... process" would include the diagnostic method claimed by applicants. Indeed, even without physical step [a] present in the claims, application of the algorithm in steps [b]-[e] seems to be a type of "process". The Supreme Court recognized as much in *Parker v. Flook,* 437 U.S. 584, 588-89, 98 S.Ct. 2522, 2524-25, 57 L.Ed.2d 451 (1978).

Flook makes clear, however, as did its forerunner, *Gottschalk v. Benson,* 409 U.S. 63, 93 S.Ct. 253, 34 L.Ed.2d 273 (1972), that even though the application of an algorithm to data is a "process" in the literal sense, it is not one that is contemplated by section 101, *i.e.,* it is "nonstatutory subject matter." Thus, mathematical algorithms join the list of non-patentable subject matter not within the scope of section 101, including methods of doing business, naturally occurring phenomenon, and laws of nature. *In re Sarkar,* 588 F.2d 1330, 1335-36, 200 USPQ 132, 136-37 (CCPA 1978); *In re Chatfield,* 545 F.2d 152, 157, 191 USPQ 730, 735 (CCPA 1976).

Construing section 101 as excluding mathematical algorithms seems somewhat at odds with the liberal view of that section expressed in a more recent Supreme Court opinion, *Diamond v. Chakrabarty,* 447 U.S. 303, 308-09, 314-16, 100 S.Ct. 2204, 2207-08, 2210-11, 65 L.Ed.2d 144 (1980). There, the Court decided that a living manmade micro-organism fell within the terms "manufacture" or "composition of matter" in section 101. In choosing such "expansive terms", stated the Court, "modified by the comprehensive `any,' Congress plainly contemplated that the patent laws would be given wide scope." *Id.* The Court went so far as to note that Congress intended statutory subject matter to include "`anything under the sun that is made by man.'" *Chakrabarty,* 447 U.S. at 309, 100 S.Ct. at *838 2207-08 (quoting S.Rep.No.1979, 82d Cong., 2d Sess. 5 (1952); H.R.Rep. No.1923, 82d Cong., 2d Sess. 6 (1952)), U.S.Code Cong. & Admin. News 1952, p. 2394.[2]

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Chakrabarty expressly rejects the argument that patentability in a new area, "micro-organisms[,] cannot qualify as patentable subject matter until Congress expressly authorizes such protection." *Id.* at 314-15, 100 S.Ct. at 2210-11. Although the Court distinguished *Parker v. Flook* in its opinion, *id.* at 315, 100 S.Ct. at 2210-11, the court's rejection of this argument 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." *Flook,* 437 U.S. at 596, 98 S.Ct. at 2528. *See also* Gottschalk v. Benson, 409 U.S. at 72, 93 S.Ct. at 257.[3]

Another recent case, *Diamond v. Diehr,* 450 U.S. 175, 182, 101 S.Ct. 1048, 1054, 67 L.Ed.2d 155 (1981), repeats the "anything under the sun" statement of *Chakrabarty,* in the context of determining that the algorithm-containing claim at issue there was statutory subject matter under section 101. *Diehr* adds that in cases of statutory construction, which is involved here because the issue is whether applicants' claims fall within the statutory meaning of "process," "we begin with the language of the statute" and, unless otherwise defined, "words will be interpreted as taking their ordinary, contemporary, common meaning." *Id. Diehr* notes that the Court has "more than once cautioned that `courts should not read into the patent laws limitations and conditions which a legislature has not expressed.'" *Id.* at 182, 101 S.Ct. at 1054 (quoting *Chakrabarty,* 447 U.S. at 308, 100 S.Ct. at 2207).

Notwithstanding those statements in *Diehr* and *Chakrabarty, Benson* remains the law. Indeed, *Benson* is cited in both *Diehr* and *Chakrabarty,* with no apparent attempt in either opinion to overrule or disapprove of it. Thus, "an algorithm, or mathematical formula ... like a law of nature ... cannot be the subject of a patent." *Diamond v. Diehr,* 450 U.S. at 186, 101 S.Ct. at 1056.

On the other hand, "the mere presence of a mathematical exercise, as a step or steps in a process involving nonmathematical steps, should not slam the door of the Patent and Trademark Office upon an applicant[.]" *In re Sarkar,* 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978). Thus, if there are physical steps included in the claim in addition to the algorithm, the claim might be eligible for patent protection. As stated in *In re Walter,* 618 F.2d 758, 205 USPQ 397 (CCPA 1980):

> 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 refine or limit claim steps (in process claims), the claim being otherwise statutory, the claim passes muster under § 101.

Id. at 767, 205 USPQ at 407 (emphasis in original; footnote omitted).

839 The *Walter* test, of deciding whether the algorithm "define[s] structural relationships" or "refine[s] or limit[s] claim steps" in an otherwise statutory claim, *839 "was not intended to be the exclusive test for determining the presence of statutory subject matter." *In re Meyer,* 688 F.2d 789, 796, 215 USPQ 193, 198 (CCPA 1982). Thus, though satisfaction of the *Walter* test necessarily depicts statutory subject matter, failure to meet that test does not necessarily doom the claim. As stated in *In re Abele,* 684 F.2d 902, 907, 214 USPQ 682, 686 (CCPA 1982), "*Walter* should be read as requiring *no more than* that the algorithm be `applied in any manner to physical elements or process steps[.]'" (Emphasis added.) That statement is followed by this proviso:

> provided that its application is circumscribed by more than a field of use limitation or non-essential post-solution activity. Thus, if the claim would be "otherwise statutory," albeit inoperative or less useful without the algorithm, the claim likewise presents statutory subject matter when the algorithm is included.[4]

Id. (citation omitted). In all instances, this critical question must be answered: "What did applicants invent?" *Id.* at 907, 214 USPQ at 687. And in answering this inquiry:

> [e]ach invention must be evaluated as claimed: yet semantogenic considerations preclude a determination based solely on words appearing in the claims. In the final analysis under § 101, the claimed invention, as a whole, must be evaluated for what it is.

Hence, the analysis requires careful interpretation of each claim in light of its supporting disclosure.

Id. (citation omitted). *See also Diamond v. Diehr,* 450 U.S. 175, 101 S.Ct. at 1048; *In re Walter,* 618 F.2d at 767, 205 USPQ at 407.

Though that analysis can be difficult, it is facilitated somewhat if, as here, the only physical step involves merely gathering data for the algorithm. As stated in *In re Christensen,* 478 F.2d 1392, 1394, 178 USPQ 35, 37-38 (CCPA 1973):

> Given that the method of solving a mathematical equation may not be the subject of patent protection, it follows that the addition of the old and necessary antecedent steps of establishing values for the variables in the equation cannot convert the unpatentable method to patentable subject matter.[5]

Accord In re Chatfield, 545 F.2d 152, 158, 191 USPQ 730, 736 (CCPA 1976), *cert. denied,* 434 U.S. 875, 98 S.Ct. 226, 54 L.Ed.2d 155 (1977). The reason for this was explained in *In re Sarkar,* 588 F.2d at 1335, 200 USPQ at 139:

> No mathematical equation can be used, as a practical matter, without establishing and substituting values for the variables expressed therein. Substitution of values dictated by the formula has thus been viewed as a form of mathematical step. If the steps of gathering and substituting values were alone sufficient, every mathematical equation, formula, or algorithm having any practical use would be per se subject to patenting as a "process" under § 101. Consideration of whether the substitution of specific values is enough to convert the disembodied ideas present in the formula into an embodiment of those ideas, or into an application of the formula, is foreclosed by the current state of the law.

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*840 See also In re Richman, 563 F.2d 1026, 1030, 195 USPQ 340, 343 (CCPA 1977) ("[N]otwithstanding that the antecedent steps are novel and unobvious, they merely determine values for the variables used in the mathematical formulae used in making the calculations. [They] do not suffice to render the claimed methods, considered as a whole, statutory subject matter."). *Accord In re Meyer,* 688 F.2d 789, 794, 215 USPQ 193, 197 (CCPA 1982) ("[data-gathering] step[s] cannot make an otherwise nonstatutory claim statutory" (citing with approval *In re Richman*)).

Whether section 101 precludes patentability in every case where the physical step of obtaining data for the algorithm is the only other significant element in mathematical algorithm-containing claims is a question we need not answer. Analysis in that area depends on the claims as a whole and the circumstances of each case. Rather, we address only the claims and other circumstances involved here.

The sole physical process step in Grams' claim 1 is step [a], *i.e.,* performing clinical tests on individuals to obtain data. The specification does not bulge with disclosure on those tests. To the contrary, it focuses on the algorithm itself, although it briefly refers to, without describing, the clinical tests that provide data. Thus, it states: "The [computer] program was written to analyze the results of up to eighteen clinical laboratory tests produced by a standard chemical analyzer that measures the levels of the chemical biological components listed...." The specification also states that "[t]he invention is applicable to any complex system, whether it be electrical, mechanical, chemical or biological, or combinations thereof." From the specification and the claim, it is clear to us that 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.

Applicants argue that *In re Abele,* 684 F.2d 902, 214 USPQ 682, warrants a reversal. We disagree.

Allowed claim 6 in *Abele* required operation of an algorithm on x-ray attenuation data, with a subsequent display. The data were available for the algorithm only after the production and detection steps, *i.e.,* after an x-ray beam

was passed through an object using a CAT scanner, and detected upon exit. The court concluded that in the absence of the algorithm, "the production, detection, and display steps would still be present and would result in a conventional CAT-scan process." 684 F.2d at 908, 214 USPQ at 687. Thus, the production and detection steps were not viewed as mere antecedent steps to obtain values to solve the algorithm; instead "[w]e are faced simply with an improved CAT-scan[.]" 684 F.2d at 909, 214 USPQ at 688. "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." *Id.*

In *Abele,* therefore, the algorithm served to improve the CAT-scan process. As such, the algorithm satisfied the *Walter* guideline of "refining a process step in a process that is otherwise statutory," and hence, it presented statutory subject matter. 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 (see discussion of *Walter, supra*), patentability here is precluded by the fact that physical step [a] merely provides data for the algorithm.

The claim here is more like those in *In re Meyer,* 688 F.2d 789, 215 USPQ 193 (CCPA 1982), on which the Board relied. The claims there were for a process and apparatus for identifying probable malfunction in a complex system. In a sense, the objective there of identifying malfunction is similar to the objective here of identifying abnormality. The Board in *Meyer* found that the claim included an algorithm and a data-gathering step, the Board rejected it as "an attempt to patent a mathematical algorithm rather than a process for producing a product," and

841   this was affirmed by *841 our predecessor court. The Board here made similar determinations, and we affirm the Board.

Thus, claim 1 is unpatentable. Claims 3-15 were not argued separately from claim 1; hence they fall with our treatment of that claim. *See, e.g., Environmental Instruments, Inc. v. Sutron Corp.,* 877 F.2d 1561, 1568, 11 USPQ2d 1132, 1138 (Fed.Cir.1989). Claim 16, which requires that the method be performed with a programmed computer, is argued separately, but applicants have not persuaded us that performing the method of claim 1 with a computer requires a different result. *See, e.g., In re Gelnovatch,* 595 F.2d 32, 37, 201 USPQ 136, 141 (CCPA 1979) ("The determination of whether a claimed method is a `process' within the meaning of 35 U.S.C. § 101 is unaffected by the particular apparatus for carrying out the method.").

Because we affirm the Board's holding that the applicants' claims are unpatentable under section 101 as being drawn to a nonstatutory mathematical algorithm, we need not address the issue of whether they are also unpatentable as a method of doing business.

AFFIRMED.

[1] It is of no moment that the algorithm is not expressed in terms of a mathematical formula. Words used in a claim operating on data to solve a problem can serve the same purpose as a formula. *See, e.g., In re Freeman,* 573 F.2d 1237, 1246, 197 USPQ 464, 471 (CCPA 1978).

[2] The Court recognized that Congress' authority to regulate exclusive rights to inventions "is exercised in the hope that `[t]he productive effort thereby fostered will have a positive effect on society through the introduction of new products and processes of manufacture into the economy, and the emanations by way of increased employment and better lives for our citizens.'" *Chakrabarty,* 447 U.S. at 307, 100 S.Ct. at 2206 (quoting *Kewanee Oil Co. v. Bicron Corp.,* 416 U.S. 470, 480, 94 S.Ct. 1879, 1885, 40 L.Ed.2d 315 (1974)).

[3] *See also* D. Chisum, *The Patentability of Algorithms,* 47 U.Pitt.L.Rev. 959 (1986). Professor Chisum suggests that *Chakrabarty* turned around the burden of proof on why something should be included or excluded in the patent system, given that it meets the apparent statutory requirements. *Id.* at 1011-12. *Chakrabarty* suggests, he concludes, that the opponents of patent protection for algorithms bear the burden of showing that such protection should be excluded from the typical protection available for other forms of intellectual property. *Id.* at 1011.

[4] We do not read the last sentence of this quote as declaring patentable any claim that is statutory without the algorithm. We read it consistently with the previous sentence, and with *Walter,* as requiring (to meet the *Walter* test) not only that the physical steps in the claim (without the algorithm) constitute a statutory process but, also, that the algorithm operates on a claimed

physical step. *Accord* <u>*In re Meyer,* 688 F.2d 789, 795, 215 USPQ 193, 198 (CCPA 1982)</u> ("the decisive question is whether that mental process is applied to physical elements or process steps in an otherwise statutory process, machine, manufacture or composition of matter").

[5] One commentator interprets <u>*In re Taner,* 681 F.2d 787, 214 USPQ 678 (CCPA 1982)</u> as overruling the quoted holding of *Christensen. See* D. Chisum, *Patentability of Algorithms,* U.Pitt.L.Rev. 959, 1002 (1986). We do not read *Taner* in that manner. *Taner* overruled an aspect of *Christensen* that approved a "point of novelty" approach, as opposed to viewing the claims as a whole, in assessing whether algorithm-containing claims are statutory.

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