

# **Elemental Subject Matter**

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## Introduction

The problem of giving substance to subject matter restrictions was long ago posed by Baron Alderson in *Neilson v. Harford*, who asked, “...where is the difference between claiming a principle, which is to be carried into effect any way you will, and claiming a mere principle?”<sup>1</sup> In modern terms, we can rephrase Alderson’s concern as follows: what is the difference between claiming a law of nature, physical phenomenon, or abstract idea, which is to be carried into effect using any device, and claiming a mere “law of nature, physical phenomena, or abstract idea”?<sup>2</sup> By *exclusio alterius*,<sup>3</sup> the enumerated list of allowed subject matter in § 101<sup>4</sup> means that there are other areas of subject matter *not* covered by the statute. These excluded areas have been commonly held to include natural laws and abstract ideas. If all that is required to make an excluded category of subject matter patentable is to stick on it a broad ornamental limitation that satisfies the § 101 subject matter clause, but serves no purpose of novelty or non-obviousness, this is just a gratuitously complicated way of having no subject matter restrictions at all, contrary to § 101.

Not only was the subject matter problem posed in *Neilson*; it was also solved there. Baron Parke held, “...the case must be considered as if, the principle being well known, the plaintiff had first invented a mode of applying it...”<sup>5</sup> A long line of Supreme Court cases have since followed this *Neilson* methodology in requiring novelty, and also often non-obviousness, to come entirely from the statutory parts of a claim.<sup>6</sup>

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<sup>1</sup> *Neilson v. Harford*, 151 Eng. Rep. 1266, 1272, 8 M & W 806, 820 (1841), Web. Pat. Cases 295, 369 (Exch. of Pleas 1844).

<sup>2</sup> *Diamond v. Diehr*, 450 U.S. 175, 185 (1981).

<sup>3</sup> The ancient canon of construction *expressio unius est exclusio alterius*, “the expression of one is the exclusion of others,” *United States v. Wells Fargo Bank*, 485 U.S. 351, 357 (1988).

<sup>4</sup> Patentable subject matter must be “...any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.” 35 U.S.C. § 101 (1952). Most of the language goes back to the 1793 Patent Act: “...any new and useful art, machine, manufacture or composition of matter and any new and useful improvement on any art, machine, manufacture or composition of matter.” 1 Stat. 318 § 1 (1793).

<sup>5</sup> *Neilson* at 1273, 8 M & W 806, 823, Web. Pat. Cases 295, 371.

<sup>6</sup> Cases applying the *Neilson* methodology include *O’Reilly v. Morse*, 56 U.S. 62 (1853); *Mackay Radio & Tel. Co. v. Radio Corp. of America*, 306 U.S. 86 (1939); *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948); and *Parker v. Flook*, 437 U.S. 584 (1978).

This paper will trace the development of subject matter law in the area of software patents, where loss of the *Neilson* test led to contradictory holdings and *de facto* legitimization of supposedly non-statutory subject matter. It proposes to restore stability and substance to subject matter law with a return to the *Neilson* doctrine, in a modern form consistent with the 1952 Patent Act.<sup>7</sup>

### *The Muddled Post-1952 Act Application of Neilson*

*Parker v. Flook* re-iterated the Supreme Court’s commitment to *Neilson*. Justice Stevens invoked prior art and novelty: “The novelty of the mathematical algorithm is not a determining factor at all.... it is treated as though it were a familiar part of the prior art.”<sup>8</sup> The Court went on to quote *Neilson*, with emphasis: “*We think the case must be considered as if the principle being well known, the plaintiff had first invented a mode of applying it...*”<sup>9</sup> Stevens correctly predicted that not following this principle would “...make the determination of patentable subject matter depend simply on the draftsman’s art...”<sup>10</sup>

Stevens then analyzed the claims in *Flook* according to the *Neilson* test: “[t]he chemical processes...are well known, as are the practice of monitoring the chemical process variables, the use of alarm limits to trigger alarms, the notion that alarm limit values must be re-computed and readjusted, and the use of computers for ‘automatic monitoring alarming.’”<sup>11</sup> Thus the device, without the algorithm, was not itself patentable -- “[o]nce that algorithm is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention.” The combined claim for the algorithm (constructive prior art) and the devices (actual prior art) was not novel.<sup>12</sup>

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<sup>7</sup> If mathematical algorithms are not subject matter under § 101, a probable consequence of a return to *Neilson* is that thousands of software patents would become invalid, since these patents are based on the novelty and non-obvious of the algorithms themselves. But see a companion paper in progress, “Mathematical Machines”, which argues that most algorithms are “machines” under § 101.

<sup>8</sup> *Flook* at 592., quoting *Neilson* at 1273, 8 M & W 806, 823 , Web. Pat. Cases 295, 371 (emphasis added by J. Stevens).

<sup>9</sup> *Id.* at 592.

<sup>10</sup> *Id.* at 593.

<sup>11</sup> *Id.* at 594.

<sup>12</sup> *Id.*

So far, this was straightforward *Neilson* analysis. But in attempting to map this analysis to the 1952 Act, Stevens went astray: “This case turns entirely on the proper construction of § 101 .... It does not involve the familiar issues of novelty and obviousness that routinely arise under §§ 102 and 103.”<sup>13</sup> How could prior art and novelty be analyzed without stepping through the rules of § 102? Stevens could only do this because the parties conceded that the non-algorithmic elements were not novel.<sup>14</sup>

Judge Rich, writing in response to *Flook*, agreed with Stevens’ conclusory statement that *Flook* was a § 101 case, not a § 102 or § 103 case.<sup>15</sup> He then argued that the phrases “new” and “invents or discovers” in § 101 do not incorporate any redundant test of novelty or non-obviousness, since these tests had been moved to § 102 and § 103.<sup>16</sup> Despite *Flook*, the Federal Circuit rejected the *Neilson* test and continued to pursue the *Freeman-Walters-Abele* (“F-W-A”) test. This test proved to be unstable and eventually allowed patentees to claim non-patentable subject matter “which is to be carried into effect any way you will.”<sup>17</sup>

#### *The Ultimate Emptiness of the Freeman-Walters-Abele Test*

Among the reasons stated in *Gottschalk v. Benson* for rejecting the algorithm patent there, limited only by a digital computer, is that it would “wholly preempt” practical use of the algorithm.<sup>18</sup> In *in re Freeman*, the C.C.P.A narrowed *Benson* as far as possible (or farther) by declaring that the test for whether a claim passed muster under § 101 was “whether in its entirety it wholly preempts” the algorithm being claimed.<sup>19</sup>

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<sup>13</sup> *Id.* at 588.

<sup>14</sup> “We also assume, since respondent does not challenge the examiner's finding, that the formula is the only novel feature of respondent's method.” *Flook* at 588. Invoking § 102 and § 103 with constructive references from § 101 is explained *infra*.

<sup>15</sup> *in re Bergy*, 596 F.2d 952, 960 (C.C.P.A. 1979).

<sup>16</sup> *Id.* But see *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 780-81 (Fed. Cir. 1985) (Rich, J.) (the word “new” in § 101 incorporates into § 101 anticipation analysis under § 102).

<sup>17</sup> *Neilson* 151 Eng. Rep. at 1272, 8 M & W at 820, Web. Pat. Cases at 371.

<sup>18</sup> *Gottschalk v. Benson*, 409 U.S. 63, 71-72 (1972).

<sup>19</sup> *in re Freeman*, 573 F.2d 1237, 1245 (C.C.P.A. 1978).

The clearest statement of how the Federal Circuit tried to apply the F-W-A test is found in *Arrhythmia Research Technology*: “...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 limited by physical elements or process steps*.” [emphasis added]<sup>20</sup> It remains unclear what was meant by “physical elements or process steps.” Did the term include general purpose digital computers? The components of digital computers, such as memories, processors, or circuits? Pencils and paper? Human brains? Everything intangible is embodied in something physical. Where, as became typical, the novelty and non-obviousness of the claim depended entirely on the algorithm, the good draftsman would make his ornamental physical elements as broad as possible, leaving some impractical alternatives (such as pencil and paper) unclaimed so as to not “wholly preempt” the algorithm. Passing the F-W-A test would come to “depend simply on the draftsman’s art.”<sup>21</sup> Once the requirements of invention were allowed to be satisfied by non-statutory subject matter, no credible distinction remained between the “physical elements” allowed to limit algorithmic claims in *Freeman* and *Abele* and very broad ornamental limitations that allowed the non-patentable subject matter to be practically “carried into effect any way you will.”<sup>22</sup>

For most of its history, the F-W-A test was applied by eliminating the most obviously generic ornamental limitations by arbitrary fiat. But the questions of how much or what kinds of physical limitation were needed, and why, were never satisfactorily answered. In *in re Grams*<sup>23</sup>, limitations that the input of the algorithm came from a physical test, or that the algorithm was running on a physical computer, were deemed insufficient to pass the F-W-A test. Claims 1-15 were rejected under § 101 because the only “physical step” was a test giving values to input into the variables of the mathematical algorithm.<sup>24</sup> The court also rejected the limitation of a general purpose digital computer -- “Claim 16, which requires that the method be performed with a programmed computer, is argued

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<sup>20</sup> *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1058 (Fed. Cir. 1992).

<sup>21</sup> *Flook* at 593.

<sup>22</sup> *Neilson* at 1272, 8 M & W 806, 820 (1841), Web. Pat. Cases 295, 369.

<sup>23</sup> *in re Grams*, 888 F.2d 835 (Fed. Cir. 1989).

<sup>24</sup> The court summarized the lengthy independent Claim 1 as follows: “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.” It characterized step [a] as “clinical laboratory tests” and steps [b]-[e] as a mathematical algorithm. *Id.* at 837.

separately but applicants have not persuaded us that performing the method of claim 1 with a programmed computer requires a different result.” The court’s only explanation of its rejected of claim 16 was to quote *in re Gelnovatch* -- “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”.<sup>25</sup> This, however, flies in the face of the core of the F-W-A test which is whether the algorithm is “applied to or limited by physical elements or process steps.”<sup>26</sup>

The end point of the F-W-A test is illustrated by *in re Warmderdam*.<sup>27</sup> Claims 1-4 were expressed in a purely abstract way.<sup>28</sup> These claims were found to flunk § 101 because they were only directed to “the manipulation of basic mathematical constructs.”<sup>29</sup> Claim 5 was found to pass muster under § 101 because it was directed to a “machine...having a memory which contains data representing” the results of carrying out the non-statutory methods of Claims 1-4. Claim 5, said the court, “is for a machine, and is clearly patentable subject matter.”<sup>30</sup>

Since all general purpose digital computers are machines with memories, this limitation was neither less preemptive nor less physical than Grams’ “programmed computer.” *Warmerdam* was also in direct conflict with *Benson* because, as there, “the mathematical formula involved here has no substantial practical application except in connection with a digital computer...the patent...in practical effect would be a patent on the algorithm itself.”<sup>31</sup> The inability of the F-W-A test to distinguish “physical elements or process steps”<sup>32</sup> that were overly broad from proper limitations

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<sup>25</sup> *Id.* at 841 quoting *in re Gelnovatch*, 595 F.2d 32, 38 (C.C.P.A. 1979).

<sup>26</sup> *Arrhythmia* at 1058.

<sup>27</sup> *in re Warmderdam*, 33 F.3d 1354 (Fed. Cir. 1994).

<sup>28</sup> Claim 1 of *Warmderdam* reads as follows:

“1. A method for generating a data structure which represents the shape of [sic] physical object in a position and/or motion control machine as a hierarchy of bubbles, comprising the steps of:

first locating the medial axis of the object and

then creating a hierarchy of bubbles on the medial axis.”

*Warmderdam* at 1358.

<sup>29</sup> *Id.* at 1360.

<sup>30</sup> *Id.*

<sup>31</sup> *Benson* at 72.

<sup>32</sup> *Arrhythmia* at 1058.

preventing a claim from “wholly preempting”<sup>33</sup> practical use of an algorithm doomed the test to triviality and confusion. Since essentially all modern applications of algorithms involve running them on computers “having memory”, an algorithm limited only by “a machine...having memory” can effectively be “carried into effect any way you will.”<sup>34</sup>

In several decisions since *in re Alappat*,<sup>35</sup> the Federal Circuit has declared the F-W-A test moribund, preferring to cite *Alappat*. *State Street v. Signature* declared that henceforth “...the *Freeman-Walters-Abele* test has little, if any, applicability to determining the presence of statutory subject matter.”<sup>36</sup> By requiring only that the algorithm have “practical utility” in order to produce a “useful, concrete, and tangible result”<sup>37</sup> *State Street* essentially rejected § 101 statutory subject matter analysis altogether, collapsing it into the § 101 utility requirement.<sup>38</sup>

#### *A Restatement of the Neilson Test Following the Structure of the 1952 Act*

For § 101 subject matter analysis to be coherent, it must serve not as a bar but as a filter, a preliminary step that alters element by element how the claims will be analyzed by § 102 and § 103. The interrelation between subject matter, novelty, and non-obviousness, contrary to *Bergy*,<sup>39</sup> is quite conscious and is utterly necessary to the proper functioning of §101. But to be clear, § 101 subject matter analysis must always precede and alter the input to § 102 and § 103, rather than reading a redundant novelty and obviousness analysis into § 101.

As phrased in *Flook*, the *Neilson* test is taken to treat the non-statutory subject matter as prior art. Since the novelty arm in *Flook* was conclusory (the parties conceded that nothing besides the algorithm was novel),<sup>40</sup> Stevens avoided the hard questions that would arise if the Federal Circuit applied *Flook* to patent cases. References would have to be read to constructively incorporate the

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<sup>33</sup> *Freeman* at 1245.

<sup>34</sup> *Neilson* at 1272, 8 M & W 806, 820, Web. Pat. Cases 295, 369.

<sup>35</sup> *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994) (*en banc*).

<sup>36</sup> *State St. Bank & Trust Co. v. Signature Fin. Group*, 149 F.3d 1368 (1989).

<sup>37</sup> *State Street* at 1375, quoting *in re Alappat*, 33 F.3d 1526, 1544.

<sup>38</sup> *State Street* at 1375.

<sup>39</sup> *in re Bergy* at 960.

<sup>40</sup> “We also assume, since respondent does not challenge the examiner's finding, that the formula is the only novel feature of respondent's method.” *Flook* at 588.

non-statutory elements. Furthermore, under §103, a reference that motivates a combination of the statutory elements might be constructively read to motivate combining the statutory with the non-statutory subject matter. This strong version of the *Neilson* test may be overkill since, in the counterfactual world where the novel algorithm is already known, it's possible that the idea of combining this algorithm with the other elements could be non-obvious. But if we simply deem the combination non-obvious (the weak version of *Neilson*) because there is no actual suggestion, we eliminate the world in which the combination would have been suggested. It is not readily apparent that there is any coherent rule to be found between these extremes, but since obviousness analysis is counter-factual anyway (what would have been obvious to POSITA<sup>41</sup>), adding constructive prior art to Winslow's Tableau<sup>42</sup> may not add too much uncertainty to obviousness analysis.

Two Supreme Court cases show how *Neilson* has been or might have been applied to obviousness analysis. *Funk Bros. Seed Co. v. Kalo Incolulant Co.* followed the constructive prior art method for "inventiveness" analysis.<sup>43</sup> It was believed that legume bacteria of different species produce an inhibitory effect on each other. The patentee discovered that there were certain species of legume-symbiotic bacteria which do not inhibit each other. The claim mixed these species together in a package, to make it easier for farmers to apply the bacteria to the proper species of legume.<sup>44</sup>

Under *Neilson* the mix itself is constructive prior art, but the mix combined with the package is novel. The Court held, consistent with *Neilson* and *Morse*, that the inventiveness of the discovery of the natural phenomenon could not be included in analyzing the inventiveness of the claim, "...however ingenious the discovery of that natural principle may have been..."<sup>45</sup> "Once nature's secret...was discovered, the *state of art* made the production of a mixed inoculant a simple step....[t]here is no way in which we could call it [an invention, i.e. non-obvious] unless we borrowed invention from the discovery of the natural principle itself. But we cannot so hold without allowing a patent to issue on one of the ancient secrets of nature now disclosed." [emphasis added]. In modern terms, the mix was constructively suggested by nature, and combining the mix and the package was either impliedly (under the weak *Neilson*) or constructively (under the strong *Neilson*) suggested.

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<sup>41</sup> 35 U.S.C. § 103.

<sup>42</sup> *In re Winslow*, 53 C.C.P.A. 1574, 1578 (1966).

<sup>43</sup> *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948).

<sup>44</sup> *Id.* at 130.

<sup>45</sup> *Id.* at 131.



In contrast, the Court in *Dann v. Johnston* ignored *Neilson*, choosing to analyzing the non-statutory computer program elements themselves under § 103, rather than constructively regarding them as prior art, as *Neilson* would prescribe.<sup>46</sup> Under our restatement of *Neilson*, application of § 101 subject matter analysis is required, in order to determine what if any constructive prior art exists, before § 102 and § 103 can be reached.

Analysis under *Neilson* would have been straightforward. While the claim in *Johnston* included some hardware -- a digital computer and a check scanner -- apparently this hardware was common prior art, for Johnston admitted that “the invention was being sold as a computer program...” to be run with hardware already owned by the banks.<sup>47</sup> The computer program, as a mathematical algorithm, would have been constructive prior art. Alternatively, the combination of the elements of the computer program was constructively suggested and thus obvious, like the mix of non-inhibitory bacteria in *Funk Bros*. The computer program by running on a computer and a check scanner would impliedly (or even expressly, if the computer code itself can be read as a reference) suggest the use of such devices, so that the combination of computer program with computer and scanner was obvious even under the weak *Neilson* test, like the combination of the bacterial mix with a package in *Funk Bros*.

### *Conclusion*

The end point of the evolution of the F-W-A test is that mathematical machines are now *de facto* patentable under § 101, despite the Supreme Court declaring that “mathematical algorithms” are unpatentable. If, as with the F-W-A test, all that is required to make a non-statutory invention patentable is to stick on it an ornamental limitation that satisfies the subject matter clause, but serves no purpose of novelty or non-obviousness, this is just a gratuitously complicated way of having no subject matter restrictions at all. Ornamental limitations now serve only to create non-statutory patents “carried into effect any way you will.” The F-W-A test has led to litigation over pointlessly ornamented claims, with contradictory holdings thrown in for good measure. It has led to claims

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<sup>46</sup> *Dann v. Johnston*, 425 U.S. 219 (1976).

<sup>47</sup> *Id.* at 220.

bloated with ornaments -- claims that are more difficult for patentees to write and potential infringers to read than claims written to satisfy just novelty, non-obviousness, and enablement.

The enumerated list in § 101 must provide meaningful limits. The C.C.P.A. and Federal Circuit precedents that, by ignoring the test of *Neilson*, *Morse*, *Funk*, and *Flook*, rendered the limits meaningless, are contrary to statute and should be overturned. We have seen how the *Neilson* test, in contrast, gives the § 101 subject matter limitations meaning. The Solicitor General should recommend the Supreme Court raise the §101 issue *sua sponte* in *Metabolite v. Laboratory Corp.*<sup>48</sup> and the Court should do so. If the Court takes such a case, it should reinstate *Neilson*.<sup>49</sup>

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<sup>48</sup> *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354 (Fed. Cir. 2004). The Supreme Court has requested the Solicitor General for an opinion on raising the § 101 issue *sua sponte*. *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.*, Supreme Court No. 04607, 125 S. Ct. 1413, 1413-14 (2005).

<sup>49</sup> But it should limit the scope of its ruling by grandfathering in most kinds of patents, including software patents, that have developed under the relaxed § 101 standards since *Diehr* and *Chakrabarty*. See this author's paper "Mathematical Machines," in progress.