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## Copyright's Hand Abstractions Test for Patent's Section 101 Subject-Matter Eligibility

Mark R. Carter

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## COPYRIGHT'S HAND ABSTRACTIONS TEST FOR PATENT'S SECTION 101 SUBJECT-MATTER ELIGIBILITY

Mark R. Carter<sup>†</sup>

### *Abstract*

*Since the Federal Circuit's 2007 In re Bilski decision and the Supreme Court's 2008 Bilski v. Kappos decision, patent law's subject-matter eligibility standard under 35 U.S.C. §101 has been uncertain. This paper posits patent law's patent-ineligible abstract ideas are science concepts and science laws, composed of science concepts, as defined by science philosophers. Somewhat analogous to copyright law, it also presents a downward patent-eligibility Hand abstractions test from an alleged abstract idea, natural law, or natural phenomenon to independent claims as a coherent, systematic, and practical approach to judging utility-patent eligibility. Patent claims manifest an innate vertical abstractions ladder, so there is no need to further abstract ideas from the claims. The fact-finder must add features to the alleged abstract idea, natural law, or natural phenomenon to move down the abstractions ladder to see whether an independent claim merges with the abstract idea, natural law, or natural phenomenon while combating human compulsions, and the test's known bias, toward over-abstraction. The test automatically*

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<sup>†</sup> Mark R. Carter, 269 Walker St #702, Detroit, Michigan 48207-4258; 202-360-4355; MarkRCarterPhD@MarkRCarterPhDPatents.com, mrc57@law.georgetown.edu. Visiting Scholar, U.S. Federal Circuit Court of Appeals 2012-13; J.D. Georgetown University Law Center 2012; American Intellectual Property Law Education Foundation Sidney B. Williams, Jr. Intellectual Property Scholar 2009-12; Georgetown CALI Excellence in Patent Licensing 2012; Visiting Student, George Washington University Law School 2011; Judicial Intern, U.S. Federal Circuit Court of Appeals 2011; Georgetown ASCAP Nathan Burkan Memorial Copyright Writing Award 2010; Haas Business School, University of California, Mathematical Finance Certificate 2007; U.S. Patent & Trademark Office Registered Patent Agent 1995; University Fellow in Theoretical Physics, University of Maryland 1990-91; Ph.D. in Theoretical Physics, Stanford University 1987; James Chadwick Memorial Prize Scholar at Erice Subnuclear Physics School 1986; B.A. in Physics & Mathematics, Harvard University 1981. This paper only expresses my own views. I thank the Georgetown University Law Center for financial support and B. Brewer for introducing me to Steven Pinker's works. I dedicate this work to the memory of my father, the Rev. Robert B. Carter, who always worked toward a better world.

*adjusts to ever-changing science concepts and laws and their word expressions.*

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## I. COPYRIGHTS, PATENTS, & THE HAND ABSTRACTIONS TEST

Though William Landes and Richard Posner hinted at applying copyright analysis to patents,<sup>1</sup> almost no one has written about the Hand abstractions test (abstractions test) applied to patent law.<sup>2</sup>

In 1995, before Landes and Posner, Maximillian Peterson analogized copyright's idea-expression split with patent's machine-program split under Section 101.<sup>3</sup> Like Judge Learned Hand's confession that deciding between ideas and expression in any copyright suit requires ad hoc judgment,<sup>4</sup> Peterson concluded that deciding between patentable machines and unpatentable algorithms in any suit requires resorting to policy.<sup>5</sup>

In the past three years, two authors have applied copyright's abstractions test to patent law. First, Tun-Jen Chiang focused on defining the invention and deciding enablement and patent scope.<sup>6</sup> He found an abstractions problem in patent law by deeming a patent's specification and claims separately define the "invention."<sup>7</sup> Chiang also proposed identifying the invention by idea novelty rather than by embodiments.<sup>8</sup> Chiang focused on the written description and enablement requirements.<sup>9</sup> But, unlike Peterson, by focusing on claim construction and enablement, Chiang in essence assumed eligibility under Section 101.<sup>10</sup> Second, Jeffrey E. Young proposed applying the abstractions test to patent-eligibility.<sup>11</sup>

Two decades ago, John Shepard Wiley Jr. tried to make

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1. WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 305-06 (2003).

2. *Nick v. Universal Pictures Corp.*, 45 F.2d 119 (2d Cir. 1930).

3. Maximillian R. Peterson, *Now You See It, Now You Don't: Was it a Patentable Machine or an Unpatentable "Algorithm"?: On Principle and Expediency in Current Patent Law Doctrine Relating to Computer/Implemented Inventions*, 64 GEO. WASH. L. REV. 90, 124-26 (1995).

4. *Peter Pan Fabrics, Inc. v. Martin Weiner Corp.*, 274 F.2d 487, 489 (2d Cir. 1960) (Hand, J.).

5. Peterson, *supra* note 3, at 124-26.

6. Tun-Jen Chiang, *Defining Patent Scope by the Novelty of the Idea*, 89 WASH. U. L. REV. 1211 (2012) [hereinafter Chiang, *Patent Scope*]; Tun-Jen Chiang, *The Levels of Abstraction Problem in Patent Law*, 105 NW. U. L. REV. 1097, 1101, 1118-22 (2011) [hereinafter Chiang, *Levels of Abstraction*].

7. Chiang, *Levels of Abstraction*, *supra* note 6, at 1101, 1118-22; see also Christopher A. Cotropia, *What is the Invention?*, 53 WM. & MARY. L. REV. 1855 (2012).

8. Chiang, *Patent Scope*, *supra* note 6, at 1212.

9. Chiang, *Levels of Abstraction*, *supra* note 6, at 1102-03.

10. See *id.*

11. Jeffrey E. Young, *A Level of Abstraction Approach for Post-Bilski § 101 Analysis*, 84 PAT. TRADEMARK & COPYRIGHT J. 875 (2012).

copyright law more coherent by applying patent law concepts.<sup>12</sup> First, he proposed redefining copyright's originality by "conditional investment," somewhat like patent's ordinary skill in the art.<sup>13</sup> Second, he proposed scrapping the idea–abstraction distinction for a "conditional creation" subject to something like examining a patent.<sup>14</sup>

This paper more thoroughly applies the abstractions test to patent-eligibility. My approach differs from Chiang's and Young's approaches. First, unlike Chiang and Young, I see an innate abstraction ladder/hierarchy in each patent's claim structure. In practice, the whole point in writing claims is to abstract invention concepts. Second, unlike Chiang, I assume the standard "unitary" invention patent view; the specification includes the claims and together they describe one invention. Third, unlike Chiang, I focus on patentable subject matter rather than novelty and nonobviousness patentability. Fourth, I compare patent claims with natural laws. Young expressly shunned this comparison.<sup>15</sup>

Part II of this paper highlights the patent-eligibility history leading to the current controversy. Part III makes plain many innate problems driving the controversy. Part IV explains why copyright tools might help understand patent law given a history of cross-over analysis and compares copyright's idea-expression split with patent's abstract idea-invention split. It also describes copyright concepts tied to the abstractions test in copyright. As copyright attaches to a work without examination, courts almost always test copyrightability during infringement suits. Part V then presents the downward patent-eligibility Hand abstractions test (patent-eligibility abstractions test) for patent-eligibility. Part VI then defines patent-ineligible abstract ideas and laws of nature sitting atop the downward patent-eligibility abstractions test as science concepts and science laws built on those concepts. Finally, Part VII applies the downward patent-eligibility abstractions test to claims in the recent case *CLS Bank International v. Alice Corp.*

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12. John Shepard Wiley Jr., *Copyright at the School of Patent*, 58 U. CHI. L. REV. 119 (1991).

13. *Id.* at 120, 146-56.

14. *Id.* at 121-37, 156-66.

15. Young, *supra* note 11 ("This article has not dealt with laws of nature, the subject of *Prometheus Laboratories Inc. v. Mayo Collaborative Services*. Perhaps a similar charting of levels of application of a law of nature would be helpful, but that discussion is for another day.").

## II. PATENT-ELIGIBILITY'S QUAG—SOFTWARE, *STATE STREET*, *AT&T*, *BILSKI*, *PROMETHEUS*, & *CLS BANK*<sup>16</sup>

Section 101 of 35 U.S.C. 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.”<sup>17</sup> Section 101 expressly defines four patent-eligible subjects: 1) processes/methods; 2) machines; 3) “manufactures,” that is, “articles of manufacture” or “manufactured articles”; and 4) compositions of matter.<sup>18</sup> The Supreme Court has excluded from patent-eligibility a few subjects: abstract ideas, laws of nature, and natural phenomenon.<sup>19</sup>

### A. *Software*

Thirty years ago, the Supreme Court finally held software tied to physically curing rubber to be a patent-eligible process/method under 35 U.S.C. Section 101.<sup>20</sup> Eventually, the Federal Circuit secured software patent-eligibility outright.<sup>21</sup>

### B. *State Street and AT&T*

Software patent applications evolved to reach unpatentable business methods, namely computerized auctions.<sup>22</sup> The Federal Circuit's *State Street Bank & Trust v. Signature Financial Group, Inc.* decision overruled the absolute ban against business method patents by allowing a patent for computerized securities-portfolio

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16. See generally LAWRENCE M. SUNG & JEFF E. SCHWARZ, PATENT LAW HANDBOOK 2010–2011 § 3:2 (2010).

17. 35 U.S.C. § 101 (2013).

18. *Id.*

19. *Diamond v. Diehr*, 450 U.S. 175, 185 (1981) (citing *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)); *Parker v. Flook*, 437 U.S. 584, 589 (1978) (Stevens, J.); *Gottschalk v. Benson*, 409 U.S. 63, 67-68 (1974); *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948); *Rubber-Tip Pencil Co. v. Howard*, 20 Wall. 498, 507 (1874); *Le Roy v. Tatham*, 14 How. 156, 175 (1853)).

20. Compare *Diehr*, 450 U.S. at 185-93 (ruling a method for curing rubber by software-controlled machines patent-eligible), with *Benson*, 409 U.S. at 64-67, 71-73 (ruling a software process converting binary coded decimals numerals to pure binary numerals patent ineligible), and *Flook*, 437 U.S. at 585-86, 594-95 (ruling a method calculating an alarm limit signaling an abnormal or dangerous chemical reaction patent ineligible).

21. *In re Allapat*, 33 F.3d 1526 (Fed. Cir. 1994) (en banc). See generally AMY LANDERS, UNDERSTANDING PATENT LAW § 23.03 (2008).

22. *In re Schrader*, 22 F.3d 290 (Fed. Cir. 1994).

management.<sup>23</sup> The 1952 Patent Act's main drafter, Judge Giles S. Rich, wrote the *State Street* opinion, so it had great weight. *State Street* rested patent-eligibility on whether an invention produced a useful, concrete, and tangible result.<sup>24</sup> *AT&T v. Excel Communications* applied *State Street* to hold that a mathematical algorithm may be part of a patent-eligible process, creating a phone-billing signal, without physically transforming or converting something.<sup>25</sup> *State Street* and *AT&T* sowed the seeds for the current patent-eligibility controversy.<sup>26</sup>

### C. *Bilski & Abstract Ideas*

In the past few years, courts have revisited patentable subject matter, that is, patent-eligibility. The Supreme Court's seminal 2008 *Bilski v. Kappos* decision<sup>27</sup> affirmed, yet criticized, the Federal Circuit's en banc *In re Bilski*.<sup>28</sup> *Bilski* involved a business method for hedging commodities' trading risk.<sup>29</sup> Both the patent examiner and the Board of Patent Appeals and Interferences rejected the claims under 35 U.S.C. Section 101.<sup>30</sup> But the examiner stressed that the claims did not involve "technological arts," while the Board rejected that reasoning.<sup>31</sup> On appeal at the Federal Circuit, Chief Judge Michel's majority opinion also rejected the technological arts test for the machine-or-transformation test. By adopting the machine-or-transformation test as the definitive patent-eligibility test, the Federal Circuit, in effect, revived the business method patent ban.<sup>32</sup>

In *Bilski v. Kappos*, a fractured Supreme Court affirmed the Federal Circuit's en banc judgment while overruling its reasoning.<sup>33</sup> Four justices joined most of Justice Kennedy's main opinion, but Justice Scalia refused to join parts II.B.2 and II.C.2.<sup>34</sup> The part

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23. *State Street Bank & Trust Co. v. Signature Fin. Grp., Inc.*, 149 F.3d 1368 (Fed. Cir. 1998) (Rich, J.).

24. *Id.* at 1373-75 (quoting *In re Allapat*, 33 F.3d at 1544).

25. *AT&T Corp. v. Excel Commc'ns, Inc.*, 172 F.3d 1352, 1358 (Fed. Cir. 1999).

26. *See, e.g.*, SUNG & SCHWARZ, *supra* note 16, § 3.2.

27. *Bilski v. Kappos*, 130 S. Ct. 3218 (2010).

28. 545 F.3d 943 (Fed. Cir. 2008) (en banc).

29. *See generally* GALE R. PETERSON & DERRICK A. PIZARRO, 2009 FEDERAL CIRCUIT YEARBOOK: PATENT LAW DEVELOPMENTS IN THE FEDERAL CIRCUIT § 1:1, 1-6 (2009).

30. *In re Bilski*, 545 F.3d at 950 (Fed. Cir. 2008) (en banc).

31. *Id.*

32. *Id.* at 960.

33. *Bilski v. Kappos*, 130 S. Ct. 3218 (2010). *See generally* SUNG & SCHWARZ, *supra* note 16, at 182-84.

34. *Bilski*, 130 S. Ct. at 3223.

supported by five justices critiqued the Federal Circuit for leaving the machine-or-transformation test as the only patent-eligibility standard.<sup>35</sup> This part also stressed that business methods might be patentable.<sup>36</sup>

As for the four-vote plurality opinions, section II.B.2 explained that the machine-or-transformation test might help decide patentability in modern times.<sup>37</sup> For instance, computer programs are now patentable.<sup>38</sup> Further, section II.C.2 warned that rejecting business methods merely because they lacked patentability until recently would force courts to pose unnecessarily complex questions, hiding patent law's goal.<sup>39</sup>

Justice Stevens' four-vote concurrence agreed that the machine-or-transformation test should not be the only test for patent-eligibility.<sup>40</sup> But, unlike Justice Kennedy, Justice Stevens absolutely rejected business method patent-eligibility.<sup>41</sup> Yet, Justice Stevens seemed to endorse the technology and technological arts test rejected by the en banc Federal Circuit.<sup>42</sup>

Justice Breyer concurred to note the other opinions' common ground.<sup>43</sup> Only Justice Scalia joined most, but not all, of Justice Breyer's opinion.<sup>44</sup> Justice Breyer stressed that all Justices agreed the claims were unpatentable, abstract, ideas.<sup>45</sup> He also stressed that the Kennedy and Stevens opinions agreed: 1) Section 101 is broad but limited; 2) transformation and reduction to a different state or thing is a clue to patentability; 3) the machine-or-transformation test is a clue but not the sole test; and 4) not everything producing a useful, concrete, and tangible result is patent-eligible.<sup>46</sup> He ended quite cryptically: "In sum, it is my view that, in reemphasizing that the 'machine-or-transformation' test is not necessarily the sole test of patentability, the Court intends neither to de-emphasize the test's usefulness nor to suggest that many patentable processes lie beyond

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35. *Id.* at 3226-27.

36. *Id.* at 3228-29.

37. *Id.* at 3227-28 (Kennedy, J., plurality).

38. *Id.* at 3228-29.

39. *Id.* at 3229.

40. *Bilski*, 130 S. Ct. at 3231-32 (Stevens, J., concurring).

41. *Id.* at 3253-57.

42. *Id.* at 3244.

43. *Id.* at 3257 (Breyer, J., concurring).

44. *Id.*

45. *Id.*

46. *Bilski*, 130 S. Ct. at 3258-59.

its reach.”<sup>47</sup>

In sum, the Supreme Court’s *Bilski v. Kappos* refused to let the Federal Circuit only apply the machine-or-transformation test. It stated many things the Federal Circuit should not do but failed to positively guide the Federal Circuit on patent-eligibility.

#### D. Prometheus & Natural Laws

In 2012, the Supreme Court’s unanimous *Mayo Collaborative Services v. Prometheus Laboratories, Inc.* decision again opined on patent-eligibility.<sup>48</sup> The patent claimed a method for treating autoimmune diseases relying on the individualized metabolism of each person receiving a compound.<sup>49</sup> The Federal Circuit had applied the machine-or-transformation test to uphold eligibility.<sup>50</sup> The Supreme Court deemed a person’s reaction to a drug a natural law.<sup>51</sup> In rejecting eligibility, Justice Breyer stressed:

If a law of nature is not patentable, then neither is a process reciting a law of nature, unless that process has additional features that provide practical assurance that the process is more than a drafting effort designed to monopolize the law of nature itself. A patent, for example, could not simply recite a law of nature and then add the instruction “apply the law.”<sup>52</sup>

Continuing, Breyer stressed the administering and determining steps and a (wherein) clause only: 1) referred the natural law to a relevant audience, doctors; 2) told doctors to perform routine tasks, and 3) told doctors natural-law details.<sup>53</sup> None of these claim elements and features made the claims patent-eligible.

Regardless, whether Breyer’s opinion helped anyone, except the Supreme Court, to understand patent-eligibility, especially in *Bilski*’s wake, remains unknown.

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47. *Id.* at 3259.

48. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289 (2012).

49. *Id.* at 1294-95.

50. *Id.* at 1296 (citing *Prometheus Labs., Inc. v. Mayo Collaborative Servs.*, 581 F.3d 1336, 1345, 1346-47 (Fed. Cir. 2009)).

51. *Id.* at 1296-97.

52. *Id.* at 1297.

53. *Id.* at 1297-98.

E. CLS Bank International v. Alice Corp. *Stalemate*

In 2013, the Federal Circuit issued its en banc ruling in *CLS Bank International v. Alice Corporation*.<sup>54</sup> Only four judges joined Judge Lourie's "main" opinion. The decision included five other opinions penned by Judges Rader, Moore, Newman, and Linn. Chief Judge Rader wrote two opinions. Judge Lourie outlined a framework identifying and defining "whatever fundamental concept appears wrapped up in the claim" and then deciding whether a claim has an "inventive concept" adding more than the "insignificant, conventional, or routine."<sup>55</sup> But, beyond the normal hand-waving, Judge Lourie gave no guidance on *how* to recognize an abstract idea. Judge Rader's first opinion stressed that no opinion garnered a majority, implying no resulting precedent.<sup>56</sup>

This caselaw is a quite confused mess.<sup>57</sup> As Mark A. Lemley and his coauthors quite aptly noted before *CLS Bank*, "[p]ut simply, the problem is that no one understands what makes an idea 'abstract,' and hence ineligible for patent protection."<sup>58</sup>

This paper *defines* "abstract idea" and "natural law" for patent law based on philosophy of science definitions. Inspired by copyright's abstractions test, it also posits a *downward* patent-eligibility abstractions test for whether a patent claim is an abstract idea, natural law, or natural phenomenon.

"Abstract ideas" in patent law are science concepts. They fall into three groups: classificatory, comparative, and quantitative. "Natural laws" in patent law are science laws. Science laws consist of universal or statistical statements built on science concepts.

Patent has links to copyright, so the abstractions test used for testing copyrightability is a candidate for testing patent-eligibility. Patent claims have a built-in vertical abstraction ladder not requiring any further abstraction. In fact, further abstraction runs afoul of the abstraction test's well-known over-abstraction bias in copyright and known human compulsions to metaphorize and abstract every object and concept.<sup>59</sup>

A downward patent-eligibility abstractions test could test patent-

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54. *CLS Bank Int'l. v. Alice Corp.*, 717 F.3d 1269 (Fed. Cir.), *cert. granted*, 134 S. Ct. 734 (2013).

55. *Id.* at 1282-84.

56. *Id.* at 1292 n.1 (Rader, C.J., concurring in part, dissenting in part).

57. *See id.* at 1321-22 (Newman, J., concurring in part, dissenting in part).

58. Mark A. Lemley et al., *Life After Bilski*, 63 STAN. L. REV. 1315, 1316 (2011).

59. *See* discussion *infra* Part III.D-E.

eligibility while counteracting these biases and compulsions. All patent claims are for ideas and rely on science concepts and science laws. A downward abstraction from the alleged “abstract idea” (i.e., science concept) or “natural law” (i.e., science law) to reach the claim can test eligibility.

Eligibility can vary by invention class. The science concept–law distinction implies that most method claims will be tested against science laws, rather than science concepts.

Further, manufactured articles and matter compositions should have natural objects, natural phenomenon, or math relationships atop the abstractions ladder.

Finally, a downward patent-eligibility abstractions test accommodates changing expressions for science concepts and science laws. Human expressions for science laws continually change with periodic revolutionary shifts. In fact, this is the whole point of science. But a downward patent-eligibility abstractions test only judges how abstract ideas and natural laws relate to claims. Like a math relation, the test plugs in an alleged science concept or science law at the ladder’s top and the claim under test at the ladder’s bottom. The downward patent-eligibility abstractions test itself has a “science-law” form composed of science concepts, for example, that it *compares* at each abstraction level. Thus, the test remains the same over time, but the results of the test change as human expressions for science concepts and science laws change.

Throughout this paper, I stress that *patent-eligibility is distinct from patentability under 35 U.S.C. Section 102 novelty and Section 103 obviousness. But, to compare claims against science concepts or science laws, claims normally must meet 35 U.S.C. Section 112(b) by particularly pointing out their subject matter.*

### III. PATENT-ELIGIBILITY’S INNATE PROBLEMS: WORDS FOR SCIENCE CONCEPTS & LAWS, CHANGING EXPRESSIONS, & LANGUAGE’S LIMITS

We must acknowledge some problems innate to deciding patent-eligibility before choosing a particular way to test it. Though these problems may be well known separately in science, engineering, philosophy, linguistics, and even patent law, they are rarely stated in one place. Thus, to make the problems clear and inform our best effort at making a patent-eligibility test, I will expressly sum them up.

Patent law issues patents for ideas.<sup>60</sup> But, the patented idea must not be an abstract idea.<sup>61</sup> Patent law deems “laws of nature, natural phenomena, and abstract ideas” as patent-ineligible subjects.<sup>62</sup>

Our legal system demands words. Thus, judging patent-eligibility involves deciding whether word expressions for patent claims match word expression for patent-ineligible laws of nature, natural phenomenon, and abstract ideas.

But, as I will detail, deciding eligibility has many innate problems which will guide us in formulating a patent-eligibility test. First, human science-concept and science-law expressions continually change with periodic revolutionary shifts as science progresses. In fact, the whole point of science is to find these better expressions. Thus, what humans understand and call a “science law” will necessarily change.

Second, conceptual-semantics linguistics teaches that languages have innate general limits in expressing concepts due to human nature.

Third, though science laws expressed through math may be fairly precise, scientists, conceptual-semantics linguists, and philosophers know words break down in describing science concepts and, thus, science laws.

Fourth, humans very heavily rely on metaphors, a way of abstracting concepts, to convey even the most sophisticated science concepts. This tendency can lead to errors in comparing science concepts and patent claims.

Fifth, though humans can see parts, humans, including lawyers and judges, compulsively abstract concepts and objects into simple schematics and structureless, holistic blobs. In essence, this is the well-known “my eyes glaze over” “(MEGO)” human tendency to gloss-over details.

These innate problems shed light on patent law’s general claim language problems and its problems comparing claims with “abstract ideas” and “laws of nature,” that is science concepts and science laws.

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60. LANDES & POSNER, *supra* note 1, at 305-06.

61. *Diamond v. Diehr*, 450 U.S. 175, 185 (1981).

62. *Id.*

### A. *Changing Science Expressions*

#### 1. Continual Change in Normal Science

Albert Einstein, an ex-patent examiner and holder of dozens of patents, and Leopold Infeld tersely summed up the whole science enterprise.<sup>63</sup> “Science” is a human mental construct.<sup>64</sup> What humans deem reality changes as science progresses.<sup>65</sup> Though humans made science concepts before inventing physics, physics started with the new quantitative concepts of mass and force and the qualitative concept of an inertial system.<sup>66</sup> As physics progressed, it destroyed old concepts and created new ones to handle new phenomena such as magnetic fields.<sup>67</sup> Also, humans replaced some universal laws over individual objects with statistical quantum probability laws over many objects.<sup>68</sup>

Many scholars have agreed with Einstein and Infeld that human expressions of science concepts and laws continually change. For instance, Rudolf Carnap stressed the changing “partial interpretations” of physics quantitative concepts.<sup>69</sup> These partial interpretations amount to a current representation of a physics laws.<sup>70</sup> The partial interpretations change as physical concepts evolve.<sup>71</sup>

John Archibald Wheeler expressed the same idea with more detail and with examples from chemistry and physics.<sup>72</sup> “Every law can be transcended.”<sup>73</sup> For instance, Daniel Bernoulli’s 1722 proposition that heat, thermal dynamics, and temperature resulted from chaotic molecular motion seemed preposterous, but scientists now know the proposition is true.<sup>74</sup> Also, chemistry once deemed valence laws fundamental, but they break down at high temperatures

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63. ALBERT EINSTEIN & LEOPOLD INFELD, *THE EVOLUTION OF PHYSICS: FROM BASIC CONCEPTS TO RELATIVITY AND QUANTA* 294-97 (1938).

64. *Id.*

65. *Id.*

66. *Id.*

67. *Id.*

68. *Id.*

69. RUDOLF CARNAP, *AN INTRODUCTION TO THE PHILOSOPHY OF SCIENCE* 102-03 (Martin Gardner ed., Basic Books 1974) (1966).

70. *Id.*

71. *Id.*

72. JOHN ARCHIBALD WHEELER, *A QUESTION OF PHYSICS: CONVERSATIONS IN PHYSICS AND BIOLOGY* 58-60 (Paul Buckley & F. David Peat eds., 1979).

73. *Id.* at 59.

74. *Id.* at 58.

and pressures.<sup>75</sup> After further investigation, all physics laws “seem like approximations.”<sup>76</sup>

Since Wheeler’s statements, physics has enshrined the theory that laws may vary with the energy scale as the “renormalization group.”<sup>77</sup>

Like Wheeler, Richard Feynman stressed that physics laws change.<sup>78</sup> For instance, Einstein’s general relativity modified Newton’s gravity.<sup>79</sup> It may not be part of nature, but *physics laws* change with time.<sup>80</sup>

## 2. Revolutionary Paradigms Shifts

Noting more dramatic changes, Thomas Kuhn stressed “normal” science proceeds from seminal, “revolutionary,” science achievements.<sup>81</sup> Kuhn’s revolutionary science examples over the ages include: Aristotle’s *Physica*, Ptolemy’s *Almagest*, Newton’s *Principia* and *Optiks*, Franklin’s *Electricity*, Lavoisier’s *Chemistry*, and Lyell’s *Geology*.<sup>82</sup> Before modern science textbooks, these works left details to be worked out that defined the legitimate problems and methods of a research field for succeeding generations of practitioners.<sup>83</sup> They were able to do so because they shared two essential characteristics.<sup>84</sup> “Their achievement was sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity. Simultaneously, it was sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve.”<sup>85</sup>

Kuhn offered Einstein’s general relativity, a theory of gravity, as a revolutionary paradigm shift away from Newton’s laws.

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75. *Id.* at 59.

76. *Id.* at 59-60.

77. *See, e.g.*, MICHAEL E. PESKIN & DANIEL V. SCHROEDER, AN INTRODUCTION TO QUANTUM FIELD THEORY 393-438 (1995).

78. RICHARD FEYNMAN, THE CHARACTER OF PHYSICAL LAW 33 (M.I.T. Press 1967) (1965).

79. *Id.*

80. *Id.*

81. THOMAS S. KUHN, THE STRUCTURE OF SCIENTIFIC REVOLUTIONS 10 (2d ed. 1970) (emphasis added).

82. *Id.*

83. *Id.*

84. *Id.*

85. *Id.* (emphasis added).

It has not, that is, shown Newton's laws to be a limiting case of Einstein's. For in the passage to the limit it is not only the forms of laws that have changed. Simultaneously we have had to alter the fundamental structural elements of which the universe to which they apply is composed.

This need to change the meaning of established and familiar concepts is central to the revolutionary impact of Einstein's theory . . . . Just because it did not involve the introduction of additional objects or concepts, the transition from Newtonian to Einsteinian mechanics illustrates with particular clarity the scientific revolution as a displacement of the conceptual network through which scientist view the world.<sup>86</sup>

Thus, human expressions of physics laws change through revolutionary paradigm shifts. But, viewing Kuhn's work in context of the other philosophers and scientists, expressions for physics laws also change through normal science.

### 3. *In re Bilski's Approaches Fail to Evolve*

Chief Judge Michel's majority opinion rejected the technological arts test.<sup>87</sup> Judge Michel faulted the tests based on "technological arts" and "technology" for being "both ambiguous and ever changing."<sup>88</sup> But as we have seen, science concepts and laws continually change implying the standard for patent-eligibility *must* change to match the new concepts and laws. Thus, the changing meaning of "technological arts" and "technology" fails to automatically knock them out for a patent-eligibility standard.

Judge Dyk's concurrence stressed that the dissenters, Judges Newman, Mayer, and Rader, ignored consistent English practice due to changing technology.<sup>89</sup> But, as with Judge Michel's opinion, this approach ignores changing human science concepts and laws.

#### *B. Languages' Innate Limits in Expressing Concepts*

The linguistics subfield conceptual semantics studies word meaning. According to Steven Pinker, conceptual semantics involves the relation of words to thoughts, human concerns, and reality.<sup>90</sup>

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86. *Id.* at 102.

87. *In re Bilski*, 545 F.3d 943, 960 (Fed. Cir. 2010) (en banc).

88. *Id.*

89. *Id.* at 973 (Dyk, J., concurring) (quoting Malla Pollack, *The Multiple Unconstitutionality of Business Method Patents*, 28 RUTGERS COMPUTER & TECH. L.J. 61, 96 (2002)).

90. STEVEN PINKER, *THE STUFF OF THOUGHT: LANGUAGE AS A WINDOW TO HUMAN*

Languages have limits in expressing concepts, including science concepts.<sup>91</sup>

Pinker has summed up many innate characteristics and problems in expressing concepts in human language.<sup>92</sup> Almost all human languages share some basic concepts.<sup>93</sup> Words digitize analog reality.<sup>94</sup> That is, words try to capture or represent human concepts about the reality around us; they are not the reality itself.<sup>95</sup> To express abstract ideas, humans almost always rely on metaphors.<sup>96</sup> Words tend to reduce each entity, idea, and object to a single, holistic, blob without parts, though humans can articulate subparts.<sup>97</sup>

This implies that humans tend to automatically think of a “patent claim” as an abstract blob, but humans can train themselves to think of the claim’s elements. Echoing Heisenberg and other science philosophers,<sup>98</sup> everyday concepts break down for modern science and modern non-local property, for instance, patents and copyrights.<sup>99</sup> Echoing Heisenberg’s thoughts, Pinker notes humans give old expressions new meanings and make new ones to describe science concepts and laws.<sup>100</sup> Ironically, Pinker notes many semantic problems climax in engineering and law, the two most important fields for patent law.<sup>101</sup>

### C. *Break Down of Words in Describing Science Concepts & Science Laws*

Word ambiguities are a well-known in patent law. “Patent claim drafting is an art, not a precise science. There is no correct or best claim.”<sup>102</sup> In fact, word ambiguities are the main problem in drafting and interpreting patent claims. Yet, law demands words for statutes, regulations, contracts, and patent claims as legal systems must apply

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THOUGHT (2007).

91. *Id.*

92. *Id.* at 428-38.

93. *Id.* at 81-82.

94. *Id.* at 3-4, 428.

95. *Id.* at 4-6, 153-234.

96. PINKER, *supra* note 90, at 6, 235-78.

97. *Id.* at 429.

98. *Infra* Part III.C.

99. *See id.* at 433-34.

100. *Id.* at 257.

101. *Id.* at 225, 228.

102. *See, e.g.*, ROBERT C. FABER, FABER ON MECHANICS OF CLAIM DRAFTING § 10.1 (6th ed. 2012).

to a quite broad range of situations. Acknowledging the innate problem with words for describing science and engineering, the U.S. Patent and Trademark Office stresses “[a] fundamental principle . . . is that *applicants are their own lexicographers*. They can define in the claims . . . in whatever terms they choose so long as any special meaning assigned to a term is clearly set forth in the specification.”<sup>103</sup>

Philosophers and scientists have noted innate problems expressing science concepts and laws in words. As our legal system demands words to judge whether a patent claim is only an abstract idea or law of nature, their insights will help judge whether a patent claim is ineligible.

### 1. Science Concepts

Words innately poorly express science concepts. Heisenberg and Feynman noted that physicists use a math language but must rely on words to describe their results.<sup>104</sup> Language concepts have been a research topic at least since Socrates.<sup>105</sup> Aristotle analyzed language forms and the structure of conclusions.<sup>106</sup> Mathematics has become a precise language *abstracting* science concepts from reality and avoiding ambiguities innate to verbal languages.<sup>107</sup> But, to describe science to others, scientists associate their mathematical or logical relationships with words.<sup>108</sup> Also, physicists judge a physicist’s understanding by his or her skill in expressing science concepts and laws in words.<sup>109</sup>

These words embody concepts. Scientists may associate new science concepts with old words or create new words to convey the concepts.<sup>110</sup> As Heisenberg explained:

Still, in the process of expansion of scientific knowledge the language also expands; *new terms are introduced and the old ones are applied in a wider field or differently from ordinary language*. Terms such as “energy,” “electricity,” “entropy” are obvious examples. In this way we develop a scientific language which may

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103. U.S. DEPT. OF COMMERCE, PATENT AND TRADEMARK OFF., MANUAL OF PATENT EXAMINING PROCEDURE § 2173.01 (rev. 9, 2012) [hereinafter MPEP] (emphasis added).

104. WERNER HEISENBERG, PHYSICS AND PHILOSOPHY 168 (1958); see FEYNMAN, *supra* note 78, at 40-41.

105. HEISENBERG, *supra* note 104, at 169.

106. *Id.*

107. *Id.* at 172.

108. *Id.* at 168; see FEYNMAN, *supra* note 78, at 40-41.

109. HEISENBERG, *supra* note 104.

110. *Id.* at 173.

be called a natural extension of ordinary language adapted to be added fields of scientific knowledge.<sup>111</sup>

But, these terms of art may easily create ambiguities in interpreting the old words with the new concepts. Also, translating the math or logic into a word language, like English, innately introduces ambiguities through concepts “lost in translation.”<sup>112</sup>

Heisenberg credits words’ poor fit for science with their origination in ancient times to communicate and think.<sup>113</sup> Language grew by chance and illogically.<sup>114</sup> “It is of course a well known fact that the words are not so clearly defined as they seem.”<sup>115</sup> (This “fact” further shows Carnap’s point that scientists talk about universal laws as “facts.”) For instance, “piece of iron” and “piece of wood” make sense, but “piece of water” does not.<sup>116</sup> And, “red” and “green” may mean very different things to different people, for instance, when one is colorblind.<sup>117</sup>

In sum, scientists grope for ways to translate their results into words. They associate existing words with science concepts and create a semantic or definitional ambiguity for the word. They *adapt* the language to try to fit the current science concepts for the current expression of laws. They also invent new words to carry their mathematical or logical science concepts. But, as with any translation, the process imperfectly captures, that is digitizes, the science concepts in words.

## 2. Science Laws

Words have innate problems expressing science laws.<sup>118</sup> Like Carnap’s scheme of partial interpretations, Heisenberg noted that physicists match symbols with observable quantities letting natural laws be described in verbal language.<sup>119</sup> Also, Carnap noted that symbolic logic gives precision to science statements, but English makes it easy to confuse singular fact statements with universal law

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111. *Id.* (emphasis added).

112. FEYNMAN, *supra* note 78, at 40; HEISENBERG, *supra* note 104, at 179.

113. HEISENBERG, *supra* note 104, at 168-69.

114. *Id.* at 168.

115. *Id.*

116. *Id.*

117. *Id.* at 169.

118. CARNAP, *supra* note 69 at 4-6; *see also* HEISENBERG, *supra* note 104, at 167-86 (discussing these problems in Chapter 10 “Language and Reality in Modern Physics”).

119. *See* HEISENBERG, *supra* note 104, at 167-86.

statements.<sup>120</sup> For instance:

If a zoologist writes in a textbook, “The elephant is an excellent swimmer”, he does not mean that a certain elephant, which he observed a year ago in a zoo, is an excellent swimmer. When he says “the elephant”, he is saying “the” in the Aristotelian sense; it refers to the entire class of elephants.<sup>121</sup>

Scientists too can fall into the trap of calling universal law statements “facts.” For instance, simple physical “fact” statements are really universal laws: “electric currents create heat when flowing through conductors;” “electric currents create magnetic fields when flowing through conductors;” and “substances expand when heated.”<sup>122</sup>

#### *D. Human Reliance on Metaphors for Even the Most Complex Science Concepts*

##### 1. Metaphors in Language

Pinker notes that language overflows with metaphors:

*[L]anguage is saturated with implicit metaphors like EVENTS ARE OBJECTS and TIME IS SPACE. Indeed, space turns out to be a conceptual vehicle not just for time but for many kinds of states and circumstances. Just as a meeting can be moved from 3:00 to 4:00, a traffic light can go from green to red, a person can go from flipping burgers to running a corporation, and the economy can go from bad to worse. Metaphor is so widespread in language that it's hard to find expressions for abstract ideas that are not metaphorical.*<sup>123</sup>

##### 2. Abstract Ideas as Metaphors

Humans almost always express abstract ideas as metaphors.<sup>124</sup> Science concepts and laws are merely a special case. Metaphors have import by capturing “relations among parts, even if the parts themselves are very different.”<sup>125</sup> In fact:

[M]any scientific theories were first stated as analogies, and often are still best explained that way: gravity is like light, heat is like a

120. CARNAP, *supra* note 69, at 3-7.

121. *Id.* at 5 (emphasis added).

122. *Id.* at 5-6.

123. PINKER, *supra* note 90, at 6 (emphasis added except for original capitalization).

124. *Id.* at 3, 6.

125. *Id.* at 254.

fluid, evolution is selective breeding. For an analogy to be scientifically useful, though, the correspondences can't apply to a part of one thing that merely resembles a part of the other. They have to apply to the relationships, and to the relationships between the relationships between the relationships.<sup>126</sup>

As discussed, Heisenberg noted the ability to simply describe science in words is deemed to show understanding.<sup>127</sup> For instance Nicolas Carnot analogized heat transfer with water in a waterfall.<sup>128</sup> "If one were to draw box-and-arrow diagrams of the two systems indicating what depends on what and what causes what, the geometry of the two diagrams would be the same; only the labels would be different."<sup>129</sup>

To work, science analogies must be disciplined.<sup>130</sup> Dedre Gentner and her collaborator Michaels Jeziorksi point out that this mental discipline is essential to the sound use of analogy in science, but it didn't come easy. Loose metaphors are the hallmarks of pseudoscience, quacks, bad science writing, and bad science teaching.<sup>131</sup>

Making science metaphors is part of associating language with science. As Heisenberg noted, scientists match science concepts with words. Pinker (and Richard Boyd) likewise notes:

[M]etaphor is one of many devices available to the scientific community to accomplish the task of accommodation of language to the causal structure of the world. . . . the task of introducing terminology, and modifying usage of existing terminology, so that linguistic categories are available which describe the casually and explanatorily significant features of the world.<sup>132</sup>

Metaphor in science, Boyd suggests, is a version of the everyday process in which a metaphor is pressed in service to fill gaps in a language's vocabulary, like *rabbit ears* to refer to the antennas that used to sprout from the tops of television sets. . . . The metaphor evolves into a technical term for an abstract concept that subsumes both the target phenomenon and the source phenomenon. It's an

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126. *Id.* (citing Dedre Gentner and collaborators).

127. HEISENBERG, *supra* note 104, at 168.

128. *Id.*

129. PINKER, *supra* note 90, at 254-55.

130. *Id.* at 255-56.

131. *Id.*

132. *Id.* at 257 (quoting Richard Boyd, *Metaphor and Theory Change: What is a "Metaphor" a Metaphor for?*, in METAPHOR AND THOUGHT (A. Ortony ed., 2d ed. 1993)) (emphasis added).

instance of something that every philosopher of science knows about scientific language and that most laypeople misunderstand: scientists don't "carefully define their terms" before beginning an investigation. Instead they use words loosely to point to a phenomenon in the world, and the meaning of words gradually become more precise as the scientists come to understand the phenomenon more thoroughly.<sup>133</sup>

This quote expressly relates science analogies to science philosophy. This giving old terms new meanings, making new terms, and analogies harkens to Heisenberg's thoughts on describing science concepts and laws with words.<sup>134</sup> The quote's suggestions of "cause," "goal," and "change" echo world-wide basic language concepts.<sup>135</sup>

### *E. Compulsive Human Abstraction*

#### 1. Stock Human Thoughts

Human "characterizations of reality" in science laws and patent claims, expressed in language, are built from a stock "inventory of thoughts."<sup>136</sup> "The inventory begins with some basic units, like events, states, things, substances, places, and goals. It specifies the basic ways in which these units can do things: acting, going, changing, being, [and] having."<sup>137</sup> Thus, science concepts and the science laws including them are built from the stock thought inventory.

Process/method claims include Pinker's "actions." Almost by definition, patent processes/methods require gerunds like Pinker's "acting, going, changing."<sup>138</sup> Process/method claim steps involve "actions . . . with a goal in mind."<sup>139</sup> Thus, the steps can have "a destination of motion . . . or the state resulting from a change."<sup>140</sup>

"Humans have a primitive concept of number, which distinguishes only one, two, and many, though they can also estimate larger quantities approximately."<sup>141</sup> An old, but true, physics joke asserts that physicists only understand one, two, and an infinite

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133. *Id.*

134. HEISENBERG, *supra* note 104, at 173.

135. *Id.* at 81-82.

136. PINKER, *supra* note 90, at 428.

137. *Id.*

138. FABER, *supra* note 102, § 4:2 (discussing method steps as gerunds).

139. PINKER, *supra* note 90, at 428.

140. *Id.*

141. *Id.* at 429.

number of things. Physicists thoroughly understand how one body moves and two bodies interact.<sup>142</sup> Statistical mechanics studies very large, practically infinite, numbers of bodies, such as molecules and atoms in a liquid or solid.<sup>143</sup> It closely relates to heat through molecular motions in solids, liquids, and gases.<sup>144</sup> But a “closed-form,” that is exact, solution for three bodies moving under each other’s influence has humbled physicists and mathematicians for centuries.<sup>145</sup>

## 2. Abstracting Objects into Schematic Models

Pinker also stresses that humans boil down objects into schematic models that can be easily spatially manipulated.<sup>146</sup> In fact, patent claim elements make up a claim diagram “stick figure,” or schematic, showing how claim elements relate.<sup>147</sup> The stick figure is a standard tool for analyzing, and checking, patent-claim structure.<sup>148</sup>

## 3. Patent Claim Elements & Whole Claims as Single “Abstract” Ideas

Humans tend to see entities and ideas as blobs without parts.<sup>149</sup> “The entire object is thought to be located in a spot, or to move as a whole, or to have a trait that suffuses it, or to change from one state to another in its entirety (as a wagon loaded with hay, or a garden swarming with bees).”<sup>150</sup>

Like everyone else, lawyers, and judges, compulsively think holistically. In fact, virtually the whole legal system worships holistic, yes or no, answers: guilty versus not guilty; liable versus not liable; infringed versus not infringed; valid versus invalid; grant versus deny; affirm versus reverse. Disputes spanning years and thousands of pages resolve into holistic, yes or no, black or white, answers. As every law student knows, cases come to “stand for” a particular rule. That rule, the holding, is normally expressed as a simple sentence or two and nicely fits into an outline or hornbook on

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142. See, e.g., HERBERT GOLDSTEIN, CLASSICAL MECHANICS (2d ed. 1980).

143. See, e.g., F. REIF, FUNDAMENTALS OF STATISTICAL MECHANICS AND THERMAL PHYSICS 47-86 (1965).

144. *Id.* at 87-127.

145. E.g., GOLDSTEIN, *supra* note 142, at 453, 528, 540.

146. PINKER, *supra* note 90, at 430.

147. FABER, *supra* note 102, § 3:22.

148. *Id.*

149. PINKER, *supra* note 90, at 429

150. *Id.*

a particular legal field. The rule is later applied in other cases under *stare decisis*. In a sense, relief has more play; damages can widely range along a single dimension, money value, and equitable relief is even more open. Even so, a court will award damages and enjoin acts versus no damages and no injunction.

So, in the context of patent claims, humans tend to think of *what a patent claim is* as a *holistic blob* (i.e., a single thing) *having “a trait.”* In other words, *humans tend to automatically associate an abstract idea with anything, including a patent claim.* Humans reduce “Claim 1” to some holistic thing. As Posner noted, patents protect ideas, unlike copyright.<sup>151</sup>

Thus, *when humans, such as patent lawyers and judges, reduce “Claim 1” to a holistic idea, that is, a single idea, it becomes quite easy to think of “Claim 1” as an “abstract idea.”*

“But humans are also capable of articulating an object into its parts and registering how they are related to one another (as in the bottom of a wagon or the edge of the garden).”<sup>152</sup> Likewise, humans can articulate claims as having parts, that is, elements.

Even so, applying the holistic “blob” precept, humans tend to reduce these elements to holistic blobs. And each claim element is a blob making a stick-figure claim schematic.<sup>153</sup>

For software, Julie Cohen and Mark Lemley noted an overly abstract view could yield patent infringement where none should exist, like a copyrighted work’s last abstractions yielding unprotected (i.e., uncopyrightable) ideas with the abstractions test.<sup>154</sup>

Perhaps showing these abstraction tendencies, patent claim language seems to have remained stable over time and across fields.<sup>155</sup> Despite changes in science and technology, claim length has failed to change much over time or between fields.<sup>156</sup>

#### *F. Words Describe Basic Mechanical Engineering*

Pinker notes that words work quite well to describe basic

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151. *Assessment Techs. of Wis., LLC v. WIREdata, Inc.*, 350 F.3d 640, 647 (7th Cir. 2003) (Posner, J.).

152. PINKER, *supra* note 90, at 429

153. FABER, *supra* note 102, § 3:22.

154. Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CAL. L. REV. 1, 49 & n.210 (2001) (quoting *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930) (Hand, J.)).

155. Kristen Osenga, *The Shape of Things to Come: What We Can Learn from Patent Claim Language Length*, 28 SANTA CLARA COMPUTER & HIGH TECH. L.J. 617 (2012).

156. *Id.*

engineering.<sup>157</sup> For instance, words can describe a toilet's basic operation very well.<sup>158</sup> They also describe other basic engineering concepts quite well: cooking recipes, first-aid instructions, house-keeping hints, sewing patterns, home-repair manuals, and sports tips.<sup>159</sup> In essence, all these examples involve basic mechanical engineering related to everyday objects. Under Carnap's system, any science laws involved are "empirical," dealing with directly observable properties rather than "theoretical."<sup>160</sup>

#### IV. COPYRIGHT LAW'S LINKS TO PATENT LAW

Copyright law has many links to patent law. First, Congress gets its power to grant copyrights and patents from the same constitutional clause. Second, the Supreme Court has often analogized copyrights and patents. Third, scholars have applied patent law concepts to copyright. Fourth, scholars have compared copyrightability with patentability.

The Constitution's Intellectual Property (IP) Clause grants Congress the "Power . . . [t]o 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."<sup>161</sup> Unlike trademarks, Congress gets its power to grant copyrights and patents from the IP Clause.<sup>162</sup>

Given the IP Clause grant, the Supreme Court has often analogized copyrights with patents and vice versa. For instance, the Court stressed its steadfast rejection of an automatic-injunction rule to remedy copyright infringement in rejecting an automatic-injunction rule to remedy patent infringement.<sup>163</sup> Also, by analogy to patent law's non-infringing staple articles defense, the Court ruled the maker of a video cassette recorder (VCR)' not vicariously liable, as the VCR

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157. PINKER, *supra* note 90, at 226-28.

158. *Id.* at 226-27.

159. *Id.* at 228.

160. CARNAP, *supra* note 69, at 6, 225-28.

161. U.S. CONST. art. I, § 8, cl. 3.

162. The Trade-Mark Cases, 100 U.S. 82, 93-95 (1879) (Miller, J.). *See generally* MARSHALL A. LEAFFER, UNDERSTANDING COPYRIGHT LAW § 1.10-13 (5th ed. 2010) (comparing patent, copyright, and trademark law); MARY LAFRANCE, UNDERSTANDING TRADEMARK LAW, §§ 1.06-1.11 (2d ed. 2009) (comparing trademark law with patent and copyright law); JANE C. GINSBURG & ROBERT A. GORMAN, COPYRIGHT LAW 8-11 (2012) (comparing copyright law with patent and trademark law).

163. *See, e.g.,* eBay, Inc. v. MercExchange, LLC, 547 U.S. 388, 392-93 (2006) (quoting Fox Film Corp. v. Doyal, 286 U.S. 123, 127-28 (1932)).

had substantial non-infringing uses.<sup>164</sup>

Like the Supreme Court, some scholars have tried making copyright analysis more precise by applying patent concepts. Wiley rejected copyright's idea-expression split and abstractions test as hopelessly vague and impractical.<sup>165</sup> Like conditioning an invention's patentability on examination, Wiley proposed making copyright conditional and analogized a traditional copyright analysis with patent examination.<sup>166</sup>

Landes and Posner linked copyrightability with patentability.<sup>167</sup> They noted both copyright and patent law failed to protect ideas.<sup>168</sup> Uncopyrightable ideas are "standard plots, stock characters, verse forms, literary and musical genres, schools of painting, dramatic conventions, iconography, and the like."<sup>169</sup> Patent-ineligible ideas are "fundamental scientific (including mathematical) and technological principles."<sup>170</sup> But, Landes and Posner related the unprotectable ideas in copyright and patent by "both . . . the enormous potential for rent seeking that would be created if property rights could be obtained in them and in the enormous transactions costs that would be imposed on would-be users."<sup>171</sup> *Prometheus* quoted the same passage by Landes and Posner in stressing that natural laws should fail patentability.<sup>172</sup>

Even so, Judge Posner contrasted copyright and patent ideas. A copyright demands only enough originality to distinguish a work from like public domain works.<sup>173</sup> Unlike copyright law, patent law requires "substantial originality," that is, novelty and non-obviousness, before granting a patent.<sup>174</sup> He also stressed patents grant greater market power as patents protect ideas, while copyrights do not.<sup>175</sup>

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164. Sony Corp. of Am. v. Universal Studios, Inc., 464 U.S. 417, 439-42 (1984).

165. Wiley, *supra* note 12, at 121-29.

166. *Id.* at 156-58.

167. LANDES & POSNER, *supra* note 1, at 305-06.

168. *Id.* at 305.

169. *Id.*

170. *Id.*

171. *Id.* at 305-06, *quoted with approval in* Mayo Collaborative Servs. v. Prometheus Labs., Inc., 132 S. Ct. 1289, 1302 (2012).

172. 132 S. Ct. at 1302.

173. Assessment Techs. of Wis., LLC v. WIREdata, Inc., 350 F.3d 640, 643 (7th Cir. 2003) (Posner, J.) (citing *Bucklew v. Hawkins, Ash, Baptie & Co.*, 329 F.3d 923, 929 (7th Cir. 2003); *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 191 F.2d 99, 102-03 (2d Cir. 1951)).

174. *Id.* (citing *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345-48 (1991)).

175. *Id.* at 647.

But, despite these differences, patent-ineligible ideas link to copyright-ineligible ideas. In introducing the abstractions test, Judge Hand compared copyright-ineligible ideas in Shakespeare's *Twelfth Night* with Einstein's theory of relativity and Darwin's *The Origin of Species*.<sup>176</sup> Seventy-five years later, a prominent 2005 case stressed the Abstraction Test's usefulness for literary works by noting relativity could function as a "literary" idea: "two different authors each can describe, with very different words, the theory of special relativity. The words will be protected as expression. The theory is a set of unprotected ideas."<sup>177</sup> Thus, copyright-ineligible ideas include patent-ineligible ideas.

Copyright law's ties to patent law, especially for copyrightability and patentability, suggest copyright tests and tools might apply to works that are both copyrightable and patentable, as well as patent law in general. Software is both copyrightable and patentable. The abstractions test has been applied to software. Recently, the abstractions test has been applied to patent law.

#### A. *Getting Intellectual Property (IP) Protection*

Patents are far harder to get than copyrights. Copyright attaches the moment an author fixes a work in a tangible medium.<sup>178</sup> A copyright holder *may* register the copyrighted work.<sup>179</sup> Registration, but not examination, is required before an infringement lawsuit may be initiated.<sup>180</sup>

In contrast, patents must be examined and issued by the U.S. Patent and Trademark Office (USPTO) before an inventor gets full patent protection.<sup>181</sup> Even so, a patent's analog to fixing in a tangible medium is conception with "reduction to practice."<sup>182</sup> Before the recent America Invents Act (AIA), the United States had a "first-to-invent" system.<sup>183</sup> An inventor got inventive priority for a patent application and issued patent from the conception date if the inventor diligently worked toward reduction to practice.<sup>184</sup> Actual reduction to

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176. *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 122 (2d Cir. 1930) (Hand, J.).

177. *Mannion v. Coors Brewing Co.*, 377 F. Supp. 2d 444, 458 (S.D.N.Y. 2005).

178. 17 U.S.C. § 102(a) (2012).

179. *Id.* § 410

180. *Id.* § 411(a).

181. 35 U.S.C. §§ 111, 131, 151.

182. *Id.* § 102(g)(2).

183. *Id.*

184. *Id.*; 37 C.F.R. § 1.131(b).

practice meant building a working model.<sup>185</sup> Constructive reduction to practice meant filing a patent application meeting the enablement and written description requirements.<sup>186</sup> Now, the AIA has established America's first-to-file system in line with most other nations. New patent applications only get priority through earlier patent applications in the U.S. or abroad.<sup>187</sup>

Due to patent's formal grant process through the USPTO, patent applicants may appeal patent-application rejections directly to district court<sup>188</sup> or the Federal Circuit.<sup>189</sup> In contrast, copyright validity is only judged during an infringement lawsuit.<sup>190</sup>

### *B. Eligible Subject Matter*

#### 1. Copyright's Idea-Expression Split: Ineligible vs. Eligible Subject-Matter

To be copyright eligible, a work must be an "original work of authorship."<sup>191</sup> Copyrightable subject matter includes: 1) literary works; 2) musical works, along with any accompanying words; 3) dramatic works, along with any accompanying music; 4) pantomimes and choreographic works; 5) pictorial, graphic, and sculptural works; 6) motion pictures and other audiovisual works; 7) sound recordings; and 8) architectural works.<sup>192</sup>

With the positive requirements of originality, authorship, and fitting into a class, the Copyright Act also carves out copyright-ineligible subject matter. Copyright does not cover "any idea, procedure, process, system, method of operation, concept, principle, or discovery."<sup>193</sup> In essence, the bar against procedures, processes, systems, and methods of operation separates copyrights from patents.<sup>194</sup>

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185. See 37 C.F.R. § 41.204(2)(ii).

186. See 35 U.S.C. § 102(g)(2); 37 C.F.R. § 41.201.

187. 35 U.S.C. §§ 119, 120 (2006).

188. *Id.* § 145.

189. *Id.* § 141.

190. 17 U.S.C. §§ 102, 408 (2012).

191. *Id.* § 102(a).

192. *Id.* §§ 102(a)(1)-(8).

193. *Id.* § 102(b); see also 37 C.F.R. § 202.1(b) (2012) (discussing "ideas, plans, methods, or devices, as distinguished from the particular manner in which they are expressed or described in a writing").

194. See *Baker v. Selden*, 101 U.S. 99 (1879) (rejecting copyright eligibility of a book-keeping system as more suitable for patent).

But, the bar against ideas, concepts, principles, and discoveries enforces a more basic exclusion from copyright protection. This “idea” bar has led to a long and rich case law weeding copyright-ineligible parts from copyrightable works.<sup>195</sup> Though an idea’s expression may be copyright eligible, the idea lacks eligibility.<sup>196</sup> Copyright calls this split the idea-expression dichotomy. As the regulations note: “*Ideas*, plans, methods, systems, or devices, as distinguished from the particular manner in which they are *expressed or described* in writing” are copyright ineligible.<sup>197</sup>

Doctrine has extended copyright ineligible ideas. First, elements necessarily following from copyright ineligible ideas are likewise copyright ineligible.<sup>198</sup> Second, stock story elements, called *scenes a faire*, are copyright ineligible.<sup>199</sup> Third, merger posits even an idea’s *expression* is copyright ineligible if the idea can only be expressed in limited ways.<sup>200</sup> If so, the idea and expression “merges” to become copyright ineligible.

## 2. Hand Abstractions Test (Abstractions Test)— Separating Copyright-Ineligible Ideas from Eligible Expression

### a. *General Test*

Judge Learned Hand first stated the abstractions test with:

It is of course essential to any protection of literary property, whether at common-law or under the statute, that the right *cannot be limited literally to the text*, else a plagiarist would escape by immaterial variations. . . .

But when the plagiarist does not take out a block in suit, but an abstract of the whole, the decision is more troublesome. Upon any work, and especially upon a play, *a great number of patterns of increasing generality will fit equally well, as more and more of the incident is left out*. The last may perhaps be no more than the most

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195. *Id.*; see also *A. A. Hoehling v. Universal City Studios, Inc.*, 618 F.2d 972 (2d Cir. 1980) (finding historical facts ineligible). See generally LEAFFER, *supra* note 162, § 2.13; GINSBURG & GORMAN, *supra* note 162, at 27-35.

196. 37 C.F.R. § 202.1(b).

197. *Id.* (emphasis added).

198. See generally GINSBURG & GORMAN, *supra* note 162, at 30-31; LEAFFER, *supra* note 162, § 2.13[B][1].

199. See generally LEAFFER, *supra* note 162, § 2.13[B][4].

200. See generally GINSBURG & GORMAN, *supra* note 162, at 30-31; LEAFFER, *supra* note 162, § 2.13[B][1].

general statement of what the play is about, and at times might consist only of its title; but there is a point in this *series of abstractions* where they are no longer protected, since otherwise the playwright could prevent the use of his ‘ideas,’ to which, apart from their *expression*, his property is never extended. . . . *In such cases we are rather concerned with the line between expression and what is expressed.*<sup>201</sup>

In sum, the abstractions test guides both infringement and copyrightability. First, to test copyrightability, the abstractions test tries to abstract ideas from the “expression” embodied in the full copyrighted work. If the expression is merely an idea, the work is uncopyrightable. If not, the work is copyrightable and “cannot be limited literally to the text.”

Second, to test infringement, one can compare the abstraction against an accused work. After a series of abstractions, the test potentially reaches uncopyrightable ideas of “what is expressed” in the copyrighted work which can no longer be infringed. A few years later, Judge Hand stressed that a play may be pirated without the dialogue as a play included “words and gestures and scenery and costume and . . . looks of the actors themselves. . . . No plagiarist can excuse the wrong by showing how much of his work he did not pirate.”<sup>202</sup> Succinctly, “[a] copyright never extends to the ‘idea’ of the ‘work,’ but only to its ‘expression,’ and that no one infringes, *unless he descends so far into what is concrete as to invade that ‘expression.*”<sup>203</sup> But, shortly before his death, Judge Hand admitted: “Obviously, no principle can be stated as to when an imitator has gone beyond copying the ‘idea,’ and has borrowed its ‘expression.’ Decisions must therefore inevitably be ad hoc.”<sup>204</sup>

Thus, the accused work need not be identical to a copyrighted work to infringe it. An abstraction of the accused work may match the copyrighted work or vice versa. But Judge Hand saw the decision between idea and expression as inevitably vague and arbitrary.

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201. *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930) (emphasis added) (citing *Holmes v. Hurst*, 174 U.S. 82, 86 (1899); *Guthrie v. Curlett*, 36 F.2d 694 (2d Cir. 1929)). See generally STEPHEN M. MCJOHN, COPYRIGHT 97-101 (2d ed. 2009).

202. *Sheldon v. Metro-Goldwyn Pictures Corp.*, 81 F.2d 49, 55-56 (2d Cir. 1936), *aff'd*, 309 U.S. 490 (1940).

203. *Nat'l Comics Publ'ns v. Fawcett Publ'ns*, 198 F.2d 927 (2d Cir. 1952) (Hand, J.) (emphasis added).

204. *Peter Pan Fabrics, Inc. v. Martin Weiner Corp.*, 274 F.2d 487, 489 (2d Cir. 1960) (Hand, J.).

*b. Non-Verbal Works*

A few years ago, an influential district-court opinion weighed applying the abstractions test to photographs.<sup>205</sup> It concluded that the idea-expression split breaks down for non-textual, that is, visual, works.<sup>206</sup> Quoting *Peter Pan*, the court noted “[i]n the case of designs, which are addressed to the aesthetic sensibilities of the observer, the test is, if possible, even more intangible.”<sup>207</sup> It also quoted and adopted views from Judge Jon O. Newman’s paper:

[W]hether courts should be making those determinations with the same modes of analysis and even the same vocabulary that was appropriate for writings. . . . [I]t is not just a matter of vocabulary. Words convey concepts, and if we use identical phrases from one context to resolve issues in another, we risk failing to notice that the relevant concepts are and ought to be somewhat different.<sup>208</sup>

The court noted Judge Jon Newman had opined one cannot divide a visual work into neat abstraction layers in precisely the same way as text.<sup>209</sup> I will return to this view later in applying the abstractions test to patents, as patent claims deal with visual concepts.

3. Eligible vs. Ineligible Subject Matter for Utility  
Patents—Abstract vs. Inventive Ideas

To be eligible for a utility patent, an entity must “invent[] or discover[] any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.”<sup>210</sup> Paraphrasing, an inventor must “invent or discover” something “new and useful” to get a patent.<sup>211</sup> Also, the patentable invention or discovery must be in one of the four classes: 1) process/method; 2) machine, 3) manufacture/article, or 4) composition of matter.<sup>212</sup>

By positively requiring invention or discovery of something

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205. *Mannion v. Coors Brewing Co.*, 377 F. Supp. 2d 444, 455-61 (S.D.N.Y. 2005) (quoting *Peter Pan Fabrics*, 274 F.2d at 489; Hon. Jon O. Newman, *New Lyrics for an Old Melody: The Idea/Expression Dichotomy in the Computer Age*, 17 CARDOZO ARTS & ENT. L.J. 691, 697 (1999); *Warner Bros. v. ABC*, 720 F.2d 231 (2d Cir. 1983) (Newman, J.); *Franklin Mint Corp. v. Nat’l Wildlife Art Exch., Inc.*, 575 F.2d 62, 65 (3d Cir. 1978)).

206. *Id.* at 458-61.

207. *Id.* at 459 (quoting *Peter Pan Fabrics*, 274 F.2d at 489).

208. *Id.* (quoting Newman, *supra* note 205, at 697).

209. *Id.* (quoting Newman, *supra* note 205, at 698).

210. 35 U.S.C. § 101 (2006).

211. *Id.*

212. *Id.*

“new and useful” that fits into one of the four classes, the Patent Act fails to specifically carve out basic subject matter ineligible for a utility patent. But, the Patent Act substantively limits inventions to novel and non-obvious inventions or discoveries.<sup>213</sup>

Even so, courts have developed patent-ineligible classes. Patent-ineligible subjects include: mathematical formulas;<sup>214</sup> products of nature and natural phenomena;<sup>215</sup> abstract ideas; and natural laws.<sup>216</sup>

#### 4. Copyright Law’s Idea–Expression Split Versus Patent Law’s Natural Law–Invention Split

Landes and Posner compared and contrasted copyright law’s idea-expression split with patent law’s natural law-invention split.<sup>217</sup> Ideas cannot be copyrighted, but their expression may be copyrighted.<sup>218</sup> Likewise, natural laws cannot be patented.<sup>219</sup> But, unlike copyright, “ideas” can be patented.<sup>220</sup> In court opinions, Posner further compared patents and copyrights:

Copyright law unlike patent law does not require substantial originality. In fact, it requires only enough originality to enable a work to be distinguished from similar works that are in the public domain, since without some discernible distinction it would be impossible to determine whether a subsequent work was copying a copyrighted work or a public-domain work.<sup>221</sup>

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213. *Id.* §§ 102, 103.

214. *Parker v. Flook*, 437 U.S. 584 (1978).

215. *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948).

216. *Diamond v. Diehr*, 450 U.S. 175, 187 (1981).

217. *See generally* GINSBURG & GORMAN, *supra* note 162, at 27-32, 137-40.

218. *Id.* (quoting *Baker v. Selden*, 101 U.S. 99 (1879); H.R. Rep. No. 94-1476, at 57 (1976); *Sheldon v. Metro-Goldwyn Pictures Corp.*, 81 F.2d 49 (2d Cir. 1936) (Hand, J.), *aff’d*, 309 U.S. 390 (1940)); *Nichols v. Universal Pictures Corp.*, 45 F.2d 119 (2d Cir. 1930) (Hand, J.); *Peter Pan Fabrics, Inc. v. Martin Weiner Corp.*, 274 F.2d 487 (2d Cir. 1960) (Hand, J.); *Mannion v. Coors Brewing Co.*, 377 F. Supp. 2d 444 (S.D.N.Y. 2005); MARSHALL A. LEAFFER, *UNDERSTANDING COPYRIGHT LAW* § 2.13, 78-92 (5th ed. 2010).

219. *But see* *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 91 F.2d 99 (2d Cir. 1951) (Frank, J.) (distinguishing copyright’s originality from patent’s inventorship); *Mazer v. Stein*, 204 F.2d 472, 474 (4th Cir. 1953) (distinguishing copyrighted works from design patents), *aff’d*, 347 U.S. 201 (1954).

220. *Mazer v. Stein*, 347 U.S. 201 (1954).

221. *Assessment Techs. of Wis., LLC v. WIREdata, Inc.*, 350 F.3d 640, 643, 647 (7th Cir. 2003) (Posner, J.) (citing *Feist Publ’ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345-48 (1991); *Bucklew v. Hawkins, Ash, Baptie & Co.*, 329 F.3d 923, 929 (7th Cir. 2003) (Posner, J.); *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 191 F.2d 99, 102-03 (2d Cir. 1951)); *see also* *ConFold Pac., Inc. v. Polaris Indus., Inc.*, 433 F.3d 952, 958-59 (7th Cir. 2006) (Posner, J.) (comparing trade secrets, patents, and copyrights).

The following table sums-up the main correspondences between copyright law and patent law:

**Table 1.**

COPYRIGHT	PATENT
Copyrightability	Validity including Eligibility
Idea	Abstract Idea, Natural Law, or Natural Phenomenon
Expression	Invention = Described & Enabled (§ 112), Novel (§ 102) & Nonobvious (§ 103)
Fixation	Conception and/or Reduction to Practice

### C. *Abstractions Test for Software*

Abstractions test is a standard copyright tool for filtering out uncopyrightable elements from a copyrighted work. With the 1980's technology boom, software writers tried to, and did, copyright software.<sup>222</sup> Thus, courts and authors naturally recognized the abstractions test might apply to software.<sup>223</sup>

As software patent protection rose, authors weighed applying the abstractions test to software patents. In 1995, Peterson briefly noted courts applied something like the abstractions test to determine the patentability of computer-implemented inventions'.<sup>224</sup> He deemed the abstractions ran from an invention's "embodiment . . . with purely 'physical steps' (i.e. a machine)" to "an embodiment of the invention as an intangible program or 'algorithm.'"<sup>225</sup> Though Peterson thought

222. *Apple Computer, Inc. v. Franklin Computer Corp.*, 714 F.2d 1240, 1248 (3d Cir. 1983). See generally LAEFFER, *supra* note 162, §§ 6.04-6.06[E]-[F]; GINSBURG & GORMAN, *supra* note 162, at 25-26, 33.

223. *Computer Assocs. Int'l v. Altai, Inc.*, 98 F.2d 693 (2d Cir. 1992); Susan L. Mashour, Note, *Proposed Judicial Guidelines for Deciding Software Infringement Actions*, 32 WAYNE L. REV. 1191, 1199-2000 (1986). See generally LAEFFER, *supra* note 162, §§ 9.04[E]-[F]; GINSBURG & GORMAN, *supra* note 162, at 139. But see George N. Grammas, Note, *The Test for Proving Copyright Infringement of Computer Software: 'Structure, Sequence, And Organization' And 'Look And Feel' Cases*, 14 WM. MITCHELL L. REV. 105 (1988) (reviewing other software copyright infringement tests).

224. Peterson, *supra* note 3, at 120-26 & nn. 258-68, 283 (1995) (discussing *Diamond v. Diehr*, 450 U.S. 175 (1981); *Parker v. Flook*, 437 U.S. 584 (1978); *Gottschalk v. Benson*, 409 U.S. 63 (1972); *In re Allapat*, 33 F.3d 1526 (Fed. Cir. 1994) (en banc)).

225. *Id.* at 123.

the abstractions test could be applied to other invention types, he saw computer-implemented inventions as the clearest abstractions test application.<sup>226</sup> Even so, he rejected a patent law abstractions test as doomed to fail and, thus, forcing judges to rely on public policy.<sup>227</sup> Julie E. Cohen and Mark A. Lemley noted an overly abstract view of software could yield patent infringement where none should exist, like a copyrighted work's last abstractions yielding unprotected ideas with the abstractions test.<sup>228</sup>

#### V. A DOWNWARD ABSTRACTIONS TEST FOR UTILITY-PATENT ELIGIBILITY

In July 2012, the Federal Circuit echoed Judge Hand's *Peter Pan* decision "'abstract ideas' test" for unpatentable subjects under Section 101. As noted, *Peter Pan* deemed the line between idea and expression as necessarily vague and ad hoc.<sup>229</sup> Likewise, the July 2012 Federal Circuit panel suggested a similar problem in testing for abstract ideas in patents.<sup>230</sup>

##### A. Patent Claims' Manifest Innate Vertical Abstractions Ladder

Patent law is innately complex because patent claims must try to capture science and technical concepts with words.<sup>231</sup> Thus, patent law has an innate abstractions problem.

The copyright abstractions test requires abstracting a copyrighted work. The work lacks an innate abstraction structure, so a fact-finder must make an abstraction from scratch.

But, patent claim drafting's whole point is to abstract an invention's key patentable concepts. The specification includes the original claims.<sup>232</sup> But the specification must enable the claims.<sup>233</sup>

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226. *Id.* at n.282.

227. *Id.* at 123, 132.

228. Cohen & Lemley, *supra* note 154, at 49 & n.210 (quoting Nichols v. Universal Pictures Corp., 45 F.2d 119, 121 (2d Cir. 1930) (Hand, J.)).

229. *Peter Pan Fabrics, Inc. v. Martin Weiner Corp.*, 274 F.2d 487, 489 (2d Cir. 1960) (Hand, J.).

230. *CLS Bank Int'l v. Alice Corp.*, 103 U.S.P.Q.2d 1297, 1303-04 (Fed. Cir. 2012) (Linn, J.) (quoting *inter alia* Donald S. Chisum, *Weeds and Seeds in the Supreme Court's Business Methods Patent Decision: New Directions for Regulating Patent Scope*, 15 LEWIS & CLARK L. REV. 11, 14 (2011); Mark A. Lemley et al., *Life After Bilski*, 63 STAN. L. REV. 1315, 1316 (2011)).

231. *See, e.g.*, FABER, *supra* note 102.

232. 35 U.S.C. § 112(b) (2006).

233. *Id.* § 112(a).

This symbiotic structure means each claim has some innate self-enablement and can help enable other claims.

Independent claims capture the broadest patentable concepts.<sup>234</sup> Thus, they abstract the specification's inventive concepts. In turn, dependent claims depend on the broadest claims and vary in scope to reach narrower concepts.<sup>235</sup> Even so, the dependent claims abstract concepts in the patent.

Thus, unlike a copyrighted work, a patent's claim structure manifests an innate abstraction ladder. So, there is no need to split a patent into two inventions matched with the specification and claims to get an abstraction ladder as Chiang did.<sup>236</sup>

Further abstracting or "boiling down" the claims will only lead to more abstract ideas than they really contain and improperly, misleadingly, ascribe these more abstract ideas to the claims. As the Second Circuit noted: "Unlike the subject matter of a patent, copyrighted material need be not new, but only original."<sup>237</sup> Thus, the Hand abstractions test for patent-eligibility would test for *new* ideas in claims. But, "new ideas" include tests for Sections 102 and 103, along with Section 101.

#### B. *Young's Horizontal Abstractions—Over-Abstraction Confusion*

Young has proposed building an abstraction for each claim at each level.<sup>238</sup> I term this a "horizontal abstraction" for each claim in the innate vertical abstraction claim structure.

Young gives a few examples. For instance, he gives an "object" (i.e., article of manufacture) abstraction ladder for a soccer ball: A) a sphere—mathematical equation for all balls; B) a ball having a spherical wall—covering any physical ball; C) a multi-panel soccer ball—covering all soccer balls; and D) a soccer ball having a valve for receiving an inflation needle.<sup>239</sup> In essence, this series abstracts the soccer ball claim (D).

But, this approach confuses the issue. The soccer ball claim (D) fails to claim the sphere (A), the ball having a spherical wall (B), and the multi-panel soccer ball (C). Even so, Section 101 subject matter

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234. FABER, *supra* note 102, § 2:10.

235. *Id.*

236. Chiang, *Levels of Abstraction*, *supra* note 6, at 1101, 1118-22.

237. *Ricker v. Gen. Elec. Co.*, 162 F.2d 141, 142 (2d Cir. 1947) (Clark, J.).

238. Young, *supra* note 11.

239. *Id.*

eligibility should not bar any of the “abstractions” except the mathematical equation, or abstract idea, of a sphere.

This horizontal abstraction approach to sifting abstract ideas *from* claim ideas is really an artifact of trying to sift ideas from expression in a copyrighted work. Though copyright fails to protect ideas, patents manifestly protect ideas.<sup>240</sup>

More to the point would be a method to tell whether the abstract idea, mathematical formula, or natural law is actually all the claim contains.

### *C. Abstractions Test in Context—Patent Merger Tests for Ineligible Subject Matter*

As noted, copyright’s abstractions test sits within a general idea-expression structure. Merger bars copyright by combining ideas with their limited expression; an idea than can only be expressed in a few ways bars copyrighting the idea’s expression.<sup>241</sup> Thus, by flipping the abstractions test to move down the abstractions ladder, *merger looks for the ways an idea can be expressed*. If an idea can only be expressed in a few ways, the work only expresses that idea and lacks copyright eligibility.

For patent law, merger should bar patenting the abstract idea. Rather than moving up abstractions ladder to test patent-eligibility, merger moves *down* the abstractions ladder from the abstract idea. Unlike copyright’s ineligible ideas, patent’s ineligible abstract ideas may be expressed in many ways. Returning to Young’s simple example, the abstract idea is the sphere. In words, a “sphere” shape can be expressed as: ball; globe; round solid figure; bubble; or orb. All these terms express the abstract “sphere” shape idea and would be patent ineligible if the sole term in a claim. Words have innate problems expressing science laws.<sup>242</sup>

Though Young did not write it, the express mathematical formula for a sphere is  $x^2 + y^2 + z^2 = R^2$ . In essence, Young assumed (correctly) that the abstract “sphere” idea and its mathematical formula expressed the same abstract idea. But, as may be obvious, not all abstract ideas reduce to formulas, and not all mathematical formulas have such simple word descriptions.

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240. See, e.g., *Confold Pac., Inc. v. Polaris Indus., Inc.*, 433 F.3d 952, 958-59 (7th Cir. 2006) (Posner, J.).

241. See generally GINSBURG & GORMAN, *supra* note 162, at 30-31; LEAFFER, *supra* note 162, § 2.13[B][1].

242. See generally GINSBURG & GORMAN, *supra* note 162, at 4-6.

#### *D. Visual Claim Concepts & Mannion's Copyright Critique*

Following *Mannion v. Coors Brewing Co.*, patent claims might fall into “literary” and “visual” types.<sup>243</sup> As “literary works,” patent claims could be compared against word forms of natural laws or abstract ideas.

The science and technical concepts in claims often involve visual descriptions. For instance, patent claims describe: structure, mounting methods, fasteners, bearings, springs, numbers, relative placement, voids, shapes, material and optical properties, fluid flow, position, materials, electrical properties, transforming rotation to translation, transferring translation to translation, sequences, movement, and transforming rotation to rotation.<sup>244</sup> In fact, many claim terms fit into these types.<sup>245</sup>

Thus, the *Mannion* literary-visual split can likely be ignored in patent law. Despite expressing non-verbal concepts, patent claim structure naturally abstracts concepts.

#### *E. Abstractions Test Like Standard Patent Infringement Analysis*

Patent claims are text. In essence, patent infringement analysis tests whether a claim's wording reads on the accused product and process. This amounts to comparing a patent's abstract description, the claims, against the accused product or process.<sup>246</sup> In essence, this process compares an abstraction of the invention against an abstraction of the accused product or process.

#### *F. Down the Abstractions Ladder to Counteract Compulsions & Test's Bias*

As noted, humans have an innate bias to abstraction.<sup>247</sup> First, humans compulsively metaphorize almost everything, even extremely sophisticated science concepts. Second, humans further compulsively abstract the real world by lumping objects and concepts into blobs. This familiar “my eyes glaze over” thinking is well-known to scientists and engineers who talk to people lacking a technical background. And, as noted, scientists, engineers, lawyers, and judges

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243. *Mannion v. Coors Brewing Co.*, 377 F. Supp. 2d 444, 455-61 (S.D.N.Y. 2005).

244. FABER, *supra* note 102, app. B, at 5-8.

245. *Id.* (listing claim terms under these types).

246. *Zenith Labs, Inc. v. Bristol-Myers Squibb Co.*, 19 F.3d 1418, 1423 (Fed. Cir. 1994) (citing *Martin v. Barber*, 755 F.2d 1564, 1567 (Fed. Cir. 1985)).

247. See discussion *supra* Part III.D-E.

are not immune from this bias. In essence, *these abstraction biases abstract up the abstraction ladder*.

To counteract these innate human compulsions, moving *downward* in abstractions from an alleged science concept or science law in the claims puts human reason to work against instinctual biases.

Also, as noted, the abstractions test has a well-known over-abstraction problem in copyright.<sup>248</sup> As patent claims have a manifest abstraction ladder, one need not further abstract the claims. The whole point of patent claims is to *abstract patentable ideas* from an invention. Given the over-abstraction bias from abstracting up from allegedly copyrightable, or copyright-infringing, works in copyright, further abstracting patent claims is unwise and risks retracing copyright's hard lessons with the abstractions test in patent law.

#### G. *Automatic Adaptation to New Science Expressions*

As noted, the whole point of science is to find new science law expressions. In fact, human science expressions, in logic, math, and language, continually change with periodic revolutionary shifts. The abstractions test for patent-eligibility has no ties to any particular human science concept or science law expression. Thus, the abstractions test for patent-eligibility can evolve as science evolves.

### VI. PATENT-INELIGIBLE ABSTRACT IDEAS, NATURAL LAWS, & NATURAL PHENOMENA

To complete the downward abstractions test for patent-eligibility, we must know where to start. What is the abstract idea, natural law, or natural phenomenon at the top?

Generally, “abstract ideas” (i.e., science concepts) and “laws of nature” (i.e., science laws), relevant to the top abstraction level will vary by invention class. For instance, method claims will normally be compared against science laws, that is, universal or statistical statements, because methods include steps or acts, such as gerunds.

#### A. *Abstract Science Ideas are Science Concepts: Classificatory, Comparative, & Quantitative*

Rudolf Carnap placed science concepts into three groups: classificatory, comparative, and quantitative.<sup>249</sup> Classificatory

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248. Cohen & Lemley, *supra* note 154, at 49 & n.210.

249. CARNAP, *supra* note 69, at 51-54.

concepts place objects in classes with more information required for placing objects in narrow classes.<sup>250</sup> For instance, biologists apply classificatory concepts to place plants and animals in species, families, and genera.<sup>251</sup> Describing something as a living organism places it in a class.<sup>252</sup> Further describing it as an animal, a narrower class, requires more information.<sup>253</sup> Labeling it a mammal needs still more information.<sup>254</sup>

Comparative concepts tell how an object relates to another object.<sup>255</sup> For instance, a psychologist may rate a job applicant as more or less imaginative than another applicant.<sup>256</sup> Also, a balancing scale can determine the heavier of two objects.<sup>257</sup> Comparative concepts are intermediate between classificatory and quantitative concepts.<sup>258</sup> For instance, labeling an object as warm or cool places it in either the warm class or the cool class.<sup>259</sup> But, the comparative concepts warmer and cooler tell how the object relates to another object.<sup>260</sup>

Quantitative concepts involve numbers and measurement.<sup>261</sup> Each quantitative concept corresponds to a comparative concept pair.<sup>262</sup> For instance, temperature can be measured in degrees. In turn, temperature corresponds to the comparative concepts of warmer and cooler, or hotter and colder.<sup>263</sup> Many measurement schemes require multiple magnitudes. For instance, unlike temperature, measuring physical size requires values for length, width, and height.

### *B. Natural Laws: Science Laws Built on Science Concepts*

Science continually struggles with innate problems dividing the abstract from the concrete.<sup>264</sup> Sciences laws sum up observed

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250. *Id.* at 51, 53.

251. *Id.* at 51.

252. *Id.*

253. *Id.*

254. *Id.*

255. CARNAP, *supra*, note 69, at 51-58.

256. *Id.* at 52.

257. *Id.* at 53-58.

258. *Id.* at 51-52.

259. *Id.* at 52.

260. *Id.* at 53.

261. CARNAP, *supra*, note 69, at 58-114.

262. *Id.* at 58.

263. *Id.* at 51, 103.

264. *Id.* at 102-03.

regularities from multiple events.<sup>265</sup> They “are nothing more than statements expressing these regularities as precisely as possible.”<sup>266</sup>

Science laws fall into two types: universal and statistical.<sup>267</sup> Universal laws state absolute relations while statistical laws state a quantitative relationship between items.<sup>268</sup> For instance, following Carnap, the statement, “All ice is cold,” is a universal law while the statement, “About half the children born each year are boys,” is a statistical law.<sup>269</sup> Equations are special cases of universal and statistical science laws.

Though not as important here, Carnap further classified laws as empirical and theoretical.<sup>270</sup> Empirical laws deal with directly observable or easily measurable properties; they tend to involve macroscopic events.<sup>271</sup>

Empirical laws may be qualitative or quantitative.<sup>272</sup> For instance, “all ravens are black” is a qualitative empirical law describing ravens as having the quality “black.”<sup>273</sup> Likewise, a quantitative empirical law generalizes relationships between quantities obtained from simple measurements.<sup>274</sup> For instance, the universal gas laws and Ohm’s law relating voltage to current and resistance are empirical quantitative laws.<sup>275</sup>

Unlike empirical laws, theoretical laws deal with concepts not so readily observable, such as microscopic events and elementary particles.<sup>276</sup> The laws are “theoretical” only in that they relate to different types of concepts and observables, not that the laws lack confirmation.<sup>277</sup>

Science laws often relate causes and effects. Machines often involve cooperating parts.<sup>278</sup> As method claims state steps or acts, often gerunds, method claims are more easily compared with science

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265. *Id.* at 3

266. *Id.*

267. CARNAP, *supra* note 69, at 3.

268. *Id.* at 6.

269. *Id.* at 3-4.

270. *Id.* at 226-29, 240-46.

271. *Id.* at 6, 225-28.

272. *Id.* at 58-59, 226-27.

273. CARNAP, *supra* note 69, at 5-6, 227.

274. *Id.* at 226-27.

275. *Id.* at 227.

276. *Id.* at 6, 227-29.

277. *Id.* at 227-29, 240-46.

278. *See* FABER, *supra* note 102, § 5:1.

laws than machines.

Given the machine-method split, different science concepts and science laws may sit atop the abstraction ladder for machines versus methods.

### C. *Patent-Ineligible Abstract Ideas & Natural Laws*

An invention is a patent-ineligible abstract idea or natural law when it is a science concept, science law, or equation expressed in words as implied by adding trivial features to the alleged science concept, science law, or equation to reach the patent claim.

### D. *Manufactured Articles & Matter Compositions—Natural Objects & Phenomena, Math Relations*

Articles of manufacture are objects.<sup>279</sup> But, perhaps showing an abstraction bias, practitioners rarely separate “manufactures” from “machines.”<sup>280</sup>

Science concepts and science laws do not sit atop the ladder for articles of manufacture. Science concepts classify, compare, or quantify phenomena.<sup>281</sup> How concepts classifying, comparing, or quantifying phenomena can be articles of manufacture is unclear. Further, science laws make general absolute or statistical statements about phenomena.<sup>282</sup> Again, it is tough to conceive of how a science law relates to an article.

But, a natural object, or natural phenomenon, or math relationship may sit atop an article abstraction ladder. Articles of manufacture are objects without moving parts.<sup>283</sup> Rocks, slabs, and maybe dirt, are natural objects. Likewise, an object might be describable by a math formula. For instance, circles and spheres are describable by an equation.<sup>284</sup> Further, naturally occurring bacteria and viruses can sit atop an abstraction ladder to try to reach genetically engineered organisms.

### E. *Computers*

Though not expressly included in my downward abstraction scheme, “computers” share some general features. They are not

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279. FABER, *supra* note 102, § 5:1.

280. *Compare id.*, with 35 U.S.C. § 101 (2006).

281. CARNAP, *supra* note 69, at 51-54.

282. *Id.* at 3.

283. FABER, *supra* note 102, § 5:1.

284. *E.g.*, Young, *supra* note 11.

science concepts, nor are they science laws made of science concepts. They are also not natural phenomena, like rain, or natural objects, like rocks or the sun. They are concrete things with interrelated parts. Justice Stevens suggests that tying business methods to machines makes the methods patent-eligible.<sup>285</sup> And, as in *Diehr*,<sup>286</sup> a computer achieving results unattainable by persons might make an invention eligible.

Regardless, the true test of patent-eligibility is whether a *particular* claim with a computer can be reached by a trivial downward abstraction from an *alleged* science concept, science law, or natural phenomenon/object. These distinctions will become clearer below in analyzing the claims in *CLS Bank v. Alice Corp.*

## VII. THE DOWNWARD PATENT-ELIGIBILITY ABSTRACTIONS TEST APPLIED TO *CLS BANK V. ALICE CORP.*

I will now show how to apply the downward patent-eligibility abstractions test with a real-world problem—the claims in *CLS Bank v. Alice Corporation*. Part of the current controversy comes from “boiling down” claims before analysis, so I state the claims verbatim before applying the test.

### A. *Claims at Issue*

Alice’s panel brief quoted five independent claims.<sup>287</sup> In my approach, the independent claims are the most abstract in the innate vertical abstractions ladders for the patents.

#### 1. Apparatus/System Claims

##### a. *U.S. Patent No. 7,725,375’s Claim 14*

14. A data processing system to enable the exchange of an obligation between parties, the system comprising:

a *communications controller*,

a data storage unit having stored therein

(a) information about a first account for a first party, independent from a second account maintained by a first exchange institution, and

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285. *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (Stevens, J., concurring).

286. *Diamond v. Diehr*, 450 U.S. 175, 187 (1981).

287. Brief for Appellant at 9-16, *CSK Bank Int’l v. Alice Corp.*, 717 F.3d 1269 (Fed. Cir. 2013).

(b) information about a third account for a second party, independent from a fourth account maintained by a second exchange institution; and

a computer, coupled to said data storage unit and said *communications controller*, that is configured to

(a) receive a transaction from said first party via said *communications controller*;

(b) electronically adjust said first account and said third account in order to effect an exchange obligation arising from said transaction between said first party and said second party after ensuring that said first party and/or said second party have adequate value in said first account and/or said third account, respectively; and

(c) generate an instruction to said first exchange institution and/or said second exchange institution to adjust said second account and/or said fourth account in accordance with the adjustment of said first account and/or said third account, wherein said instruction being an irrevocable, time invariant obligation placed on said first exchange institution and/or said second exchange institution.<sup>288</sup>

The claim-14 set is shallow; nine of the eleven dependent claims 15–25 directly depend on claim 14.<sup>289</sup>

*b. U.S. Patent No. 7,149,720's Claim 68—'375  
Patent's Claim 14 Without the Controller*

68. A data processing system to enable the exchange of an obligation between parties, the system comprising:

a data storage unit having stored therein

(a) information about a first account for a first party, independent from a second account maintained by a first exchange institution,

(b) information about a third account for a second party, independent from a fourth account maintained by a second exchange institution; and

a computer, coupled to said data storage unit, that is configured to

(a) receive a transaction;

(b) electronically adjust said first account and said third account in order to effect an exchange obligation arising from said transaction between said first party and said second party after ensuring that

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288. U.S. Patent No. 7,725,375 col. 66 ll. 1-30 (filed Jun. 27, 2005) (issued May 25, 2010) (emphasis added).

289. *Id.* at col. 66 ll. 31-62.

said first party and/or said second party have adequate value in said first account and/or said third account, respectively; and(c) generate an instruction to said first exchange institution and/or said second exchange institution to adjust said second account and/or said fourth account in accordance with the adjustment of said first account and/or said third account, wherein said instruction being an irrevocable, time invariant obligation placed on said first exchange institution and/or said second exchange institution.<sup>290</sup>

Claim 68 seems identical to claim 14 except it lacks a controller, italicized in claim 14. Like the claim 14 set, the claim-68 set is shallow; nine of the eleven claims, 69-79, depend directly on claim 68.<sup>291</sup> In fact, claims 69-79 look identical to claims 15-25.

## 2. '375 Patent's Apparatus/Product Claim 39

### 39. A computer program product comprising

a computer readable storage medium having computer readable program code embodied in the medium for use by a party to exchange an obligation between a first party and a second party, the computer program product comprising:

program code for causing a computer to send a transaction from said first party relating to an exchange obligation arising from a currency exchange transaction between said first party and said second party; and

program code for causing a computer to allow viewing of information relating to processing, by a supervisory institution, of said exchange obligation, wherein said processing includes

(1) maintaining information about a first account for the first party, independent from a second account maintained by a first exchange institution, and information about a third account for the second party, independent from a fourth account maintained by a second exchange institution;

(2) electronically adjusting said first account and said third account, in order to effect an exchange obligation arising from said transaction between said first party and said second party, after ensuring that said first party and/or said second party have adequate value in said first account and/or said third account, respectively; and

(3) generating an instruction to said first exchange institution

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290. U.S. Patent No. 7,149,720 col. 69 ll. 20-42 (filed Dec. 31, 2002) (issued Dec. 12, 2006).

291. *Id.* at col. 69 l. 43-col. 70 l. 21.

and/or said second exchange institution to adjust said second account and/or said fourth account in accordance with the adjustment of said first account and/or said third account, wherein said instruction being an irrevocable, time invariant obligation placed on said first exchange institution and/or said second exchange institution.<sup>292</sup>

Claim 39 only has two dependent claims, claims 40-41.<sup>293</sup> Both depend directly on claim 39.<sup>294</sup>

### 3. Method Claims

#### *a. U.S. Patent No. 6,912,510's Claim 68*

68. A method of exchanging an obligation between parties, wherein an exchange obligation is administered by a supervisory institution, the method performed by the supervisory institution, comprising:

maintaining a first account for a first party, independent from a second account maintained by a first exchange institution;

maintaining a third account for a second party, independent from a fourth account maintained by a second exchange institution;

electronically adjusting said first account and said third account in order to effect the exchange obligation between said first party and said second party after ensuring that said first party and said second party have adequate value in said first account and said third account, respectively; and

providing an instruction to said first exchange institution and said second exchange institution to adjust said second account and said fourth account in accordance with the adjustment of said first account and said third account, wherein said instruction being an irrevocable, time invariant obligation placed on said first exchange institution and said second exchange institution.<sup>295</sup>

The claim 68 set is shallow; six of the seven dependent claims 69-75 directly depend on claim 68.<sup>296</sup>

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292. '375 Patent col. 68 ll. 5-35.

293. *Id.* at col. 68 ll. 36-41.

294. *Id.*

295. U.S. Patent No. 6,912,510 col. 67 l. 38-col. 68 l. 21 (filed May 9, 2000) (issued Jun. 28, 2005).

296. *Id.* at col. 68 ll. 22-39.

*b. U.S. Patent No. 5,970,479's Claim 33*

33. A method of exchanging obligations as between parties, each party holding a credit record and a debit record with an exchange institution, the credit records and debit records for exchange of predetermined obligations, the method comprising the steps of:

(a) creating a shadow credit record and a shadow debit record for each stakeholder party to be held independently by a supervisory institution from the exchange institutions;

(b) obtaining from each exchange institution a start-of-day balance for each shadow credit record and shadow debit record;

(c) for every transaction resulting in an exchange obligation, the supervisory institution adjusting each respective party's shadow credit record *or* shadow debit record, allowing only these transactions that do not result in the value of the shadow debit record being less than the value of the shadow credit record at any time, each said adjustment taking place in chronological order; and

(d) at the end-of-day, the supervisory institution instructing ones of the exchange institutions to exchange credits or debits to the credit record and debit record of the respective parties in accordance with the adjustments of the said permitted transactions, the credits and debits being irrevocable, time invariant obligations placed on the exchange institutions.<sup>297</sup>

Only claim 34 depends on claim 33.<sup>298</sup>

*B. District Court's "Abstract Idea"*

1. Not a Science Concept

As discussed, science concepts are classificatory, comparative, or quantitative. They put objects into classes (e.g., hot or cold), compare them (e.g., hotter or colder), or express a comparison as a quantity (e.g., temperature in degrees).

The district court rejected the claims as merely expressing the abstract idea:

[T]he Court agrees that the methods are of employing a neutral intermediary to ensure that parties to an exchange can honor a proposed transaction, to consummate the exchange simultaneously to minimize the risk that one party does not gain the fruits of the exchange, and then irrevocably to direct the parties, or their value holders, to adjust their accounts or records to reflect the concluded

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297. U.S. Patent 5,970,479 col. 65 ll. 23-50 (filed May 28, 1993) (issued Oct. 19, 1999).

298. *Id.* at col. 65 ll. 51-54.

transaction.<sup>299</sup>

This “abstract idea” is hard to understand. Its complexity makes it almost incoherent and may make it seem more “abstract” than it really is. Luckily, the district court explained it:

This is a basic business or financial concept much like those struck down in *Bilski II* or *Ultramercial*. At the heart of these claims is the fundamental idea of employing a neutral intermediary to ensure that parties to an exchange can honor a proposed transaction, to consummate the exchange simultaneously to minimize the risk that one party does not gain the fruits of the exchange, and then irrevocably to direct the parties, or their value holders, to adjust their accounts or records to reflect the concluded transaction. *Using an intermediary, which may independently maintain records or accounts on the parties to ensure each party has sufficient value or worth to complete a proposed exchange, as a way to guarantee that a transaction is ultimately honored by all parties, thereby minimizing risk, remains a fundamental, abstract concept.*<sup>300</sup>

This explanation has three sentences. The first sentence merely states that the alleged abstract idea is a basic concept. The second sentence states the idea again almost verbatim. Finally, the third sentence, in italics, clarifies the idea.

This idea is not a science concept. First, the idea fails to place objects into classes (e.g., expensive or cheap), so it is not a classificatory science concept. Second, the idea fails to compare objects (e.g., account A worth more than account B), so the idea is not a comparative science concept. Third, the idea fails to fix objects to a number range (e.g., tagging accounts with dollar values), so the idea is not a quantitative science concept.

## 2. In Science-Law Form

Science laws may be universal or statistical. They describe large numbers of phenomena. Here, the science law must have something to do with:

[U]sing an intermediary, which may independently maintain records or accounts on the parties to ensure each party has sufficient value or worth to complete a proposed exchange, as a way to guarantee that a transaction is ultimately honored by all

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299. *CLS Bank Int'l v. Alice Corp.*, 768 F. Supp. 2d 221, 243-44 (D.D.C. 2011), *rev'd*, 685 F.3d 1341 (Fed. Cir. 2012), *and reh'g en banc granted, opinion vacated*, No. 2011-1301, 2012 WL 4784336 (Fed. Cir. Oct. 9, 2012).

300. *Id.* (emphasis added).

parties, thereby minimizing risk.<sup>301</sup>

Replacing “to ensure” with “ensures” makes a universal science law:

[U]sing an intermediary, which may independently maintain records or accounts on the parties [*ensures*] each party has sufficient value or worth to complete a proposed exchange, as a way to guarantee that a transaction is ultimately honored by all parties, thereby minimizing risk.<sup>302</sup>

Ignoring “as a way . . . minimizing risk,” as a redundant description, this sentence makes an absolute statement required for a science law form: “using an intermediary . . . ensures each party has sufficient value/worth to complete a proposed exchange.” Thus, the district court’s abstract idea has the *form* of a science law.

But is this sentence a universal science law? If “ensures” means “absolutely guarantees,” then the sentence makes an absolute statement required for a universal science law. As the district court explained, “ensures” is “a way to guarantee.”<sup>303</sup> But, even if “ensures” means “makes more likely,” then the sentence makes a probabilistic statement required for a statistical science law. Even so, it is unclear whether either the district court’s statement *really is* a universal science law.

Regardless, I take the district court’s “abstract idea” as a science law and construct the *downward* abstraction ladder for the claims at issue.

### C. Method Claims 68 in ‘510 Patent & 33 in ‘479 Patent.

The most important issue is whether one can construct a non-trivial downward ladder from this alleged abstract idea in the claims to the actual claims. As science laws often describe causes and effects, method claims are especially amenable to comparison with science laws. In essence, making a downward abstractions ladder adds features to the alleged science concept or law to try to reach the claim.

#### 1. Non-Trivial “Electronically Adjusting” to reach ‘510 Patent’s Patent-Eligible Claim 68

Claim 68’s preamble states “[a] method of exchanging an

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301. *Id.*

302. *Id.*

303. *Id.*

obligation between parties, wherein an exchange obligation is administered by a supervisory institution, the method performed by the supervisory institution.”<sup>304</sup> Rearranging the preamble, it states, “a supervisory institution administers an exchange obligation between parties.”

This preamble differs from the alleged “abstract idea.” Unlike the “abstract idea,” this preamble says nothing about ensuring “each party has sufficient value/worth to complete a proposed exchange.” But, the phrase, “using an intermediary” seems equivalent to “supervisory institution administers an exchange . . . between parties,” if one excludes “obligation.” Of less import, but still different, the “intermediary” is a “supervisory institution.” Thus, claim 68’s preamble only has “using an intermediary” but not “ensures each party has sufficient value/worth to complete a proposed exchange.”

Does the rest of claim 68 add trivial features to the abstract idea? Claim 68 requires “*electronically adjusting said first account and said second account in order to effect the exchange obligation between said first party and said second party after ensuring that said first party and said second party have adequate value in said first account and said third account, respectively. . . .*”<sup>305</sup> The unitalicized text is equivalent to the phrase, “ensures each party has sufficient value/worth to complete said proposed exchange” in the alleged abstract idea. But, the italicized text adds a feature to the alleged abstract idea; the alleged abstract idea says nothing about “electronically adjusting” anything.

This addition has import. Claims must be read in the specification’s light.<sup>306</sup> The specification includes the claims.<sup>307</sup> Even so, *without* referring to the other claims or the rest of the specification, the alleged abstract idea alone “using an intermediary,” could include a supervisory institution or a person sending postal mail between parties or a person shaking hands with each party. “Electronically adjusting” takes claim 68 away from a trivial addition in a downward abstraction from the alleged idea. Thus, the downward abstraction ladder from the alleged abstraction idea cannot

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304. U.S. Patent No. 6,912,510 col. 67 ll. 38-42 (filed May 9, 2000) (issued Jun. 28, 2005).

305. *Id.* at col. 68 ll. 7-13 (emphasis added).

306. Phillips v. AWH Corp., 415 F.3d 1303, 1316 (Fed. Cir. 2005) (quoting *In re Am. Acad. Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004); 37 C.F.R. § 1.75(d)(1) (2012)); see also MPEP, *supra* note 103, at § 2111.

307. 37 C.F.R. §§ 1.75(a), (d).

reach claim 68.

Thus, method claim 68 is patent-eligible in this analysis. Though claim 68 should be patent-eligible when tested against the district court's idea, *this analysis says nothing about whether claim 68 is, or is not, novel or non-obvious.*

2. '479 Patent's Claim 33 Fails 35 U.S.C. § 112—Moot Eligibility

Claim 33:

33. A method of exchanging obligations as between parties, each party holding a credit record and a debit record with *an exchange institution*, the credit records and debit records for exchange of predetermined obligations, the method comprising the steps of:

- (a) creating a shadow credit record and a shadow debit record for each stakeholder party to be held independently by *a supervisory institution from the exchange institutions*;
- (b) obtaining from each exchange institution a start-of-day balance for each shadow credit record and shadow debit record;
- (c) for every transaction resulting in an exchange obligation, *the supervisory institution* adjusting each respective party's shadow credit record *or* shadow debit record, allowing only these transactions that do not result in the value of the shadow debit record being less than the value of the shadow credit record at any time, each said adjustment taking place in chronological order; and
- (d) at the end-of-day, the supervisory institution *instructing ones of the exchange institutions* to exchange credits or debits to the credit record and debit record of the respective parties in accordance with the adjustments of the said permitted transactions, the credits and debits being irrevocable, time invariant obligations placed on the exchange institutions.<sup>308</sup>

*a. Facially Ambiguous Subject Matter—"Exchange Institutions" & "Ones"*

Title 35 Section 112(b) requires the "claims particularly point[] out and distinctly claim[] the subject matter the applicant regards as his invention."

First, claim 33's "exchange institutions," is ambiguous. Step (a) refers to "the exchange institutions," but the only possible antecedent is the preamble's singular "an exchange institution." This antecedent

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308. U.S. Patent 5,970,479 col. 65 ll. 23-50 (filed May 28, 1993) (issued Oct. 19, 1999) (emphasis added).

mismatch is especially confusing as “a supervisory institution” seems to be at least part of, if not the same as, the “exchange institution.” Also, step (d) requires “the supervisory institution instructing ones of the exchange institutions.” Again, the “supervisory institution” may be the “exchange institution[.]”

Second, the odd “ones” phrase defies comprehension as it is both singular and plural, and “instructing ones of the exchange institutions” may or may not refer to the preamble’s singular “an exchange institution,” the earlier “exchange institutions,” or both. *How many is “ones”?*

*b. Prosecution History Leaves “Exchange” & “Ones” Ambiguous*

Interpreting a patent claim demands looking closely at its prosecution history.<sup>309</sup> Rather than skipping this key step, I expressly examine the history.

1. Only § 103 Obviousness Rejections

Independent claim 33 seems to have been filed as claim 32 in the original U.S. application on May 28, 1993.<sup>310</sup> On July 31, 1996, Peter K. Trzyna of Baker & McKenzie sent a Preliminary Amendment adding claims 34-38.<sup>311</sup>

On January 23, 1997, the USPTO issued the First Office Action.<sup>312</sup> It rejected all the claims, 1-38, under 35 U.S.C. Section 103.<sup>313</sup> On July 23, 1997, Rob Sokohl filed an amendment;<sup>314</sup> it left

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309. *See* Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 30-31 (1997) (unanimous).

310. *See* Patent Appl. (May 28, 1993), ‘479 Patent, <http://portal.uspto.gov/pair/PublicPair> (select “Patent Number” bubble; search “5,970,479” as patent number; follow “Image File Wrapper” tab; download “Claims” document received May 28, 1993).

311. Prelim. Amend. (July 31, 1996), ‘479 Patent, <http://portal.uspto.gov/pair/PublicPair> (select “Patent Number” bubble; search “5,970,479” as patent number; follow “Image File Wrapper” tab; download “Change of Address,” “Transmittal Letter,” “Applicant Arguments/Remarks Made in an Amendment,” “Claims,” and “Amendment/Req. Reconsideration-After Non-Final Reject (sic),” documents received Aug. 2, 1996).

312. Non-Final Rej’n (Jan. 23, 1997), ‘479 Patent, <http://portal.uspto.gov/pair/PublicPair> (select “Patent Number” bubble; search “5,970,479” as patent number; follow “Image File Wrapper” tab; download “Notice of Formal Drawings Required,” “List of References cited by applicant and considered by examiner,” “List of references cited by examiner,” and “Non-Final Rejection” documents [hereinafter First Office Action]).

313. First Office Action, *supra* note 312, at 2-4.

314. Amend. & Resp. under 37 C.F.R. §§ 1.111 & 1.115 (Jul. 23, 1997), ‘479 Patent, <http://portal.uspto.gov/pair/PublicPair> (select “Patent Number” bubble; search “5,970,479” as patent number; follow “Image File Wrapper” tab; download “Extension of Time,” “Transmittal

claim 32 unchanged.<sup>315</sup>

On October 29, 1997, Sokohl interviewed Examiner Barton Bainbridge to discuss “whether the customized contract of the preamble” in independent data processing system claims 34-38 “should be given patentable weight.”<sup>316</sup>

On November 13, 1997, the USPTO finally rejected all claims, 1-39, under Section 103.<sup>317</sup> On January 12, 1998, Sokohl responded to the Final Rejection by arguing without amending any claims.<sup>318</sup>

On January 29, 1998, Sokohl interviewed Bainbridge by phone, and they agreed the claims were allowable.<sup>319</sup>

## 2. One or Two Exchange Institutions & How Many is “Ones”?

The arguments against the 103 rejections only suggest the supervisory institution is separate from an exchange institution. Exchanging obligations manifestly implies at least *two parties*. Trzyna and Sokohl never changed claim 33, originally filed as claim 32. Sokohl’s July 23, 1997 Amendment and Response to the First Office Action discussed claim 32:

The present invention recites in claim 32 a method for exchanging obligations as between parties. The creation of a shadow credit and debit record for each stakeholder party to be held independently by *a supervisory institution* is recited in claim 32, *part (a)*. These shadow records initially contain the start-of-day balances of all parties’ credit and debit records, and are adjusted during the day

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Letter,” “Applicant Arguments/Remarks Made in an Amendment,” “Claims,” and “Amendment/Req. Reconsideration-After Non-Final Reject” documents received July 23, 1997) [hereinafter Amend. & Resp. to First Office Action].

315. *Id.*

316. Interview Summ. (Oct. 29, 1997), ‘479 Patent, <http://portal.uspto.gov/pair/PublicPair> (select “Patent Number” bubble; search “5,970,479” as patent number; follow “Image File Wrapper” tab; download “Examiner Interview Summary Record (PTOL – 413)” (Nov. 13, 1997)).

317. Final Rej’n at 2–8 (Nov. 13, 1997), ‘479 Patent, <http://portal.uspto.gov/pair/PublicPair> (select “Patent Number” bubble; search “5,970,479” as patent number; follow “Image File Wrapper” tab; download “Final Rejection”).

318. Reply under 37 C.F.R. § 1.116 (Jan. 12, 1998), ‘479 Patent, <http://portal.uspto.gov/pair/PublicPair> (select “Patent Number” bubble; search “5,970,479” as patent number; follow “Image File Wrapper” tab; download “Transmittal Letter,” “Change of Address,” “Miscellaneous Incoming Letter,” “Applicant Arguments/Remarks Made in an Amendment,” “Amendment/Req. Reconsideration-After Non-Final Reject”) [hereinafter Reply to Final Rej’n].

319. Interview Summ. (Jan. 23, 1998), ‘479 Patent, <http://portal.uspto.gov/pair/PublicPair> (select “Patent Number” bubble; search “5,970,479” as patent number; follow “Image File Wrapper” tab; download “Examiner Interview Summary Record (PTOL – 413)”).

for every transaction resulting in an exchange obligation. Claim 32 recites that at the end-of-day, these shadow credit and debit records *are exchanged with the credit record and debit record of the respective parties*, in accordance with the adjustments of the permitted transactions, making the credit and debits irrevocable.<sup>320</sup>

I read “exchanged with . . . the respective parties” to mean the supervisory institution sends its shadow record information to each party’s exchange institution. This clears the ambiguity between exchange and supervisory institutions.

Even so, this argument fails to state whether both parties use *one* exchange institution, or whether each party has a *different* exchange institution. Sokohl’s January 12, 1998 Reply to the Final Rejection mentioned claim 32 in passing,<sup>321</sup> but failed to expressly discuss it. The Reply never mentions “institution.” The patent, the Correction Certificate, and the prosecution fail to cure the antecedent basis and “ones” ambiguities, so claim 33’s subject matter remains unclear.

Thus, claim 33 fails to meet Section 112(b). As claim 33’s subject matter is unclear, claim 33’s subject matter eligibility under Section 101 is moot.

*D. Apparatus/System Claims 14 in ‘375 Patent & 68 in ‘720 Patent—Patent-Eligible By “Electronically Adjust”*

Though in a different patent, claim 14 only differs from claim 68 by adding, in italics above, “a communications controller” where the “computer . . . receive[s] a transaction from said communications controller.”<sup>322</sup> Thus, claim 14, in essence, “depends” on claim 68, so claim 68 is likely more abstract than claim 14.

It is only *likely* more abstract because, against conventional wisdom, merely adding words to a claim fails to necessarily make a narrower claim. For instance, “B is determined by A,” is narrower than, “B is determined, *at least in part*, by A.”<sup>323</sup> And, as claim 14 does not really depend on claim 68, unless through a common prosecution history, claim differentiation doctrine<sup>324</sup> fails to presume that claim 14 is narrower than claim 68.

The abstractions ladder and comparison are slightly different from the method claims. Science law statements often describe acts

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320. Amend. & Resp. to First Office Action, *supra* note 314, at 14 (emphasis added).

321. Reply to Final Rej’n, *supra* note 318, at 6.

322. Compare ‘375 Patent col. 66 ll. 1-30, with ‘720 Patent col. 69 ll. 20-42.

323. Interview with Paul Hickman, in Palo Alto, Cal. (1994).

324. *E.g., Envtl. Designs Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 699 (Fed. Cir. 1984).

and effects. These statements fit well with method claims describing steps or acts, but an apparatus/system is not a cause, effect, or act. Echoing Justice Breyer's *Prometheus* opinion, an apparatus cannot be eligible if it merely implements a science law.<sup>325</sup> Thus, the abstractions ladder will test whether the apparatus or machine merely implements a science law.

The district court's science law (i.e., "abstract idea") was "using an intermediary . . . ensures each party has sufficient value/worth to complete a proposed exchange."<sup>326</sup> Claim 68's preamble claims "a data processing system to enable the exchange of an obligation between parties."<sup>327</sup> This includes "using an intermediary."

System claim 68's structure elements are the data storage unit and a computer. Claim 68 includes a computer "electronically adjust[ing] said first account and said third account in order to effect an exchange obligation . . ."<sup>328</sup> "Electronically adjusting" was a non-trivial feature making patent 510's method claim eligible. Thus, "electronically adjusting" can also make the system claim eligible if the rest of the claim is no more abstract than the district court's abstract idea.

What part of claim 68 corresponds to the remainder of the abstract idea, that is, "ensures each party has sufficient value/worth to complete a proposed exchange?"<sup>329</sup> The computer "electronically adjust[s]" the accounts after "ensuring that said first party and/or said second party have adequate value in said first account and/or said second account, respectively."<sup>330</sup> This "ensuring" phrase differs only trivially from the district court's "ensures each party has sufficient value/worth . . ."<sup>331</sup> Thus, as with the method claims, "electronically adjust," takes system claim 68 away from a trivial addition in a downward abstraction from the alleged idea. So, the downward abstraction ladder from the alleged abstraction idea cannot reach system claim 68, and system claim 68 should be patent-eligible.

As system claim 14, in effect, adds a controller to claim 68, claim 14 is also eligible. As with the method claims, *this analysis*

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325. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1297 (2012).

326. *CLS Bank Int'l v. Alice Corp.*, 768 F. Supp. 2d 221, 243 (D.D.C. 2011), *rev'd*, 685 F.3d 1341 (Fed. Cir. 2012), *and reh'g en banc granted, opinion vacated*, No. 2011-1301, 2012 WL 4784336 (Fed. Cir. Oct. 9, 2012)

327. '720 Patent col. 69 ll. 20-21.

328. *Id.* at col. 69 ll. 29-31.

329. *CLS Bank Int'l*, 768 F. Supp. 2d at 243.

330. '720 Patent col. 69 ll. 29-30.

331. *Compare id.*, with *CLS Bank Int'l*, 768 F. Supp. 2d at 243.

says nothing about whether the system claims 68 and 14 are, or are not, novel or non-obvious under 35 U.S.C. Sections 102-103.

*E. '375 Patent's Apparatus/Product Claim 39 Should Fail § 112 ¶ 2/112(b)—Otherwise Patent-Eligible*

1. Endless-Loop Ambiguity Meets 35 U.S.C. § 112 ¶ 2/112(b) under Current Law

The apparatus/product claim 39 claims a “computer program product.”<sup>332</sup> Unlike the system claims, this product has one element—“a computer readable storage medium.”<sup>333</sup> Of course, this claim seems directed to disk drives, flash drives, CD's, DVD's, and the like.

Unlike the method and system claims, claim 39's preamble, “a computer program product,” lacks a clear correspondence to any part of the district court's abstract idea (i.e., “using an intermediary”). But, claim 39's body includes a storage medium “for use by a party to exchange an obligation between a first party and a second party.”<sup>334</sup> This phrase surely includes “using an intermediary” which is “a party.”<sup>335</sup>

*a. Facially, Logically, Ambiguous under § 112 ¶ 2/112(b)*

Claim 39 defines itself in an endless loop. Claim 39 is to “A computer program product comprising a computer readable storage medium . . . the computer program product comprising program code. . . .”<sup>336</sup> “Comprising” has a special meaning; the claim's preamble comes before it while the claim's body specifying the claim elements comes after it. Claim 39 has two preambles: “A computer program product” and “A computer program product comprising a computer readable storage medium for use by a party to exchange an obligation between a first party and a second party, the computer program product . . . .”<sup>337</sup> In other words, the computer program product comprises the computer product. Also, the computer program product comprises the computer readable storage medium

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332. '375 Patent col. 68 l. 5.

333. *Id.* at col. 68 ll. 5-6.

334. *Id.* at col. 68 ll. 7-8.

335. *CLS Bank Int'l*, 768 F. Supp. 2d at 243.

336. '375 Patent col. 68 ll. 5-9.

337. *Id.*

and, separately, comprises program code.

Comprising can be used twice in the same claim if no ambiguity arises. For instance, claims may state, “A widget comprising a flange; and a housing; the housing further comprising an object and a thing.”

But facially, claim 39 is quite ambiguous. In essence it claims “[a] product comprising a medium, the product comprising a thing.” Is the product the medium, the thing, or both?

And, nothing requires a storage medium claim to have claim 39’s double comprising form. *In re Beauregard* dealt with claims involving computer readable media.<sup>338</sup> Those claims have two forms. Claims 1-9 have the form “A widget . . . said widget comprising a computer . . . medium . . . *having* computer program code means *in* said medium, said widget *having/including*: computer code means . . . .” where a widget is either an “an article of manufacture” or a “computer program product.”<sup>339</sup> Claim 10 differs by listing method steps.<sup>340</sup> The patent claim at issue in *CyberSource Corp. v. Retail Decisions, Inc.* also listed method steps.<sup>341</sup>

*b. Double-Comprising Format Matches Beauregard’s Claim 1*

Though *In re Beauregard* had claims without the double comprising format, its claim 1 did use claim 39’s double comprising format. Thus, claim 39 meets Section 112(b) under current case law.

2. Non-Trivial Additions to Reach the Computer Program Product

Applying the same abstraction ladder to the district’s science law (i.e., “abstract idea”) likely makes claim 39 eligible.

But, an “abstract idea” for an article of manufacture should be a natural object, natural phenomenon, or math relationship, rather than the district court’s science law. An “object” might be described by a mathematical formula, like an equation for a circle or sphere.<sup>342</sup>

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338. *In re Beauregard*, 53 F.3d 1583 (Fed. Cir. 1997); U.S. Patent No. 5,710,578 (filed May 9, 1990) (issued Jan. 20, 1998).

339. ‘578 Patent col. 16 ll. 33-41, col. 16 ll. 53-62, col. 17 ll. 16-25, 57-64, col. 18 ll. 17-25, 44-52, col. 19 ll. 36-45, col. 20 ll. 3-12, 37-47 (emphasis added).

340. *Id.* at col. 21 l. 40-col. 22 l. 4.

341. *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011) (quoting *Ex Parte* Reexamination Certificate col. 2 ll. 9-14, U.S. Patent No. 6,029,154 C1 (requested Oct. 26, 2004) (issued Aug. 5, 2008)).

342. Young, *supra* note 11.

It is hard to think of an instance where a computer memory, regardless of what software it contains, would be deemed a natural object or phenomenon with trivial features. The only natural “phenomenon” readily coming to mind is a magnetized rock. Thus, it is hard to think of a computer readable medium that would *fail* Section 101 eligibility.

#### CONCLUSION

This paper has presented a new way to decide subject matter eligibility for a utility patent. It posits patent law’s abstract ideas are science concepts, and science laws composed of science concepts, as defined by science philosophers. Science concepts and science laws must have particular word forms.

Inspired by copyright law, a Hand abstractions test allows judging whether a patent claim is an abstract idea, natural law, or natural phenomenon. Patent claims manifest an innate vertical abstractions ladder, so there is no need to further abstract ideas from the claims. To combat human compulsions and the test’s known over-abstraction bias, the fact-finder must first choose the alleged science concept, science law, or natural phenomenon. Then, the fact-finder must add features to move *down* the abstractions ladder to see whether an independent claim merges with the abstract idea. The test automatically adjusts to ever-changing science concepts and laws and their word expressions. Like a math relation, the test accepts new science concepts and science laws at the ladder’s top to test against patent claims. Thus, the test need not change as science advances.

As it is impossible to test a claim’s subject matter eligibility without knowing a claim’s subject matter, a claim should first pass 35 U.S.C. Section 112(b) before deciding subject-matter eligibility under 35 U.S.C. Section 101.

This downward patent-eligibility Hand abstractions test gives a much more coherent, systematic, and practical approach to judging patent-eligibility than has appeared in recent court opinions and articles.