

Patent-Eligible Inventions After *Bilski*: History and Theory

JOSHUA D. SARNOFF*

The U.S. Supreme Court has continued to require that patentable subject-matter eligibility determinations be made by reference to three historic, categorical exclusions (scientific principles, natural phenomena, and abstract ideas), which must be treated as if already known even when newly discovered by the applicant. Various thoughtful scholars have alternatively urged that these exclusions should be viewed restrictively or that such eligibility decisions should be avoided. But these scholars underappreciate the systemic and social benefits of categorical exclusions, and particularly of treating these categories as if they were already known prior art. In any event, the Federal Circuit, the U.S. Patent and Trademark Office, and the public must now draw lines between eligible inventions and ineligible applications of excluded discoveries.

This Article supplies a history and theory of subject-matter eligibility to guide such line drawing, based on the recognition that (for both eligibility and patentability) the Patent Act has always required, and still requires, creative, human invention in the application of such categorically excluded discoveries. So long as these basic discoveries continue to be treated as if already known, relying on threshold eligibility determinations will improve efficiency and reduce patent-system errors. Supplying clearer criteria for the additional creativity required for eligibility will further reduce overall patent-system burdens and will better direct investment, effort, invention, and disclosure towards more creative, patentable applications.

These categorical eligibility exclusions were justified historically on both deontological and utilitarian moral grounds. Prudence counsels retaining them, given the high social stakes involved, the lack of theoretical or empirical demonstration that competing innovation approaches are better, and the moral concerns that would be raised by their elimination. The Article thus concludes with an exhortation to celebrate rather than to reluctantly embrace categorical exclusions of patentable subject matter, their prior-art status, and the line drawing that eligibility determinations require, to better protect the public domain of science, nature, and ideas while simultaneously improving the patent system.

* Associate Professor, DePaul University College of Law, Chicago, Illinois. The Author was counsel of record for law professors in the *Prometheus Laboratories* case and for law professors and AARP in the *Bilski* case in the Supreme Court and in the Federal Circuit, and co-counsel for the American Medical Association and other medical organizations in the *Myriad Genetics* case in the Federal Circuit and in the district court. The Author thanks the many people who have contributed to this Article at different stages of the process. The Article originated as a draft presented at the Oracle Corporation-George Washington University Law School Symposium *What's Ahead on Highway 101* (Nov. 3, 2006). A more extensive historical treatment is the subject of a forthcoming book, JOSHUA D. SARNOFF, *PATENTS AND MORALITY: RELIGION, SCIENCE, NATURE, AND THE LAW* (forthcoming). Finally, this Article is dedicated to the memory and legacy of Edward C. Walterscheid.

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INTRODUCTION

Legal line drawing is difficult. But it is even more difficult without a theory of why the lines are being drawn, what they are supposed to fence in and out, and whether categorical exclusions are preferable to case-by-case rejections. This is the current state of uncertainty in the United States in regard to eligible subject matter under section 101 of the Patent Act¹ and its relationship to various patentability doctrines following *Bilski v. Kappos*.² In *Bilski*, the Supreme Court by the narrowest of majorities approved of treating business methods as patent-eligible inventions, while noting that such claims “raise special problems in terms of vagueness and suspect validity” and that without a “high enough bar . . . patent examiners and courts could be flooded with claims that would put a chill on creative endeavor and dynamic change.”³ The Court of Appeals for the Federal Circuit is now issuing a burgeoning set of eligibility decisions regarding a wide range of practical and useful applications including software, in *Research Corporation Technologies*;⁴ medical treatment, in *Prometheus Laboratories*, which is currently under review by the Supreme Court;⁵ and isolated genetic sequences, in the Myriad Genetics case.⁶ In Myriad Genetics, the federal government admitted that it has routinely issued patents for isolated and purified genetic sequences even though it lacks the legislative authority to treat them as patent-eligible inventions;⁷ this was not the first time the government may have made such errors regarding purified materials.⁸

The Supreme Court in *Bilski* reiterated, as a matter of long-standing precedent and stare decisis, that the patent system categorically excludes “laws of nature, physical phenomena, and abstract ideas”⁹ (referred to as

1. 35 U.S.C. § 101 (2006).

2. 130 S. Ct. 3218 (2010).

3. *Id.* at 3228–29.

4. *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859 (Fed. Cir. 2010).

5. *Prometheus Labs., Inc. v. Mayo Collaborative Servs.*, 628 F.3d 1347 (Fed. Cir. 2010), *cert. granted*, 131 S. Ct. 3027 (2011).

6. *Ass’n for Molecular Pathology v. USPTO*, 702 F. Supp. 2d 181 (S.D.N.Y. 2010), *aff’d in part, rev’d in part*, 653 F.3d 1329 (Fed. Cir. 2011) [hereinafter “Myriad Genetics”].

7. Brief for the United States as Amicus Curiae in Support of Neither Party at 18, *Ass’n for Molecular Pathology v. USPTO*, 653 F.3d 1329 (Fed. Cir. 2011) (No. 2010-1406); *see also id.* at 17–36.

8. *See generally* P.J. Federico, *Louis Pasteur’s Patents*, 86 *SCIENCE* 327 (1937) (citing *Am. Fruit Growers, Inc. v. Brogdex Co.*, 283 U.S. 1 (1931); *Parke-Davis & Co. v. H. K. Mulford Co.*, 189 F. 95 (S.D.N.Y. 1911), *aff’d in part, rev’d in part*, 196 F. 496 (2d Cir. 1912)) (discussing the Pasteur yeast patent as a purified biological material, Judge Learned Hand’s famous decision justifying patents for purified chemical materials as new and different things, and an intervening Supreme Court decision that clarified eligibility limits, which he recognized made it doubtful that such subject matter could be patented); Jon M. Harkness, *Dicta on Adrenalin(e): Myriad Problems with Learned Hand’s Product-of-Nature Pronouncements in Parke-Davis v. Mulford*, *J. PAT. & TRADEMARK OFF. SOC’Y* (forthcoming 2011), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1881193 (examining the context in which the patent dispute between *Parke-Davis* and *Mulford* arose).

9. *Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010); *see Diamond v. Chakrabarty*, 447 U.S. 303, 309

“science, nature, and ideas”), despite the broad categorical language of eligible subject matter recited in section 101.¹⁰ Various thoughtful scholars have recently argued that we should view these exclusions from eligibility restrictively to avoid excluding from the patent system “whole fields of endeavor,”¹¹ that we should focus principally on claim scope¹² and should rely principally on other patentability doctrine policy levers to constrain improper access to the patent system,¹³ or that we should avoid eligibility decisions entirely.¹⁴ The Federal Circuit under Chief Judge Rader has signaled its desire to avoid both the “abstract idea” category and reliance on eligibility doctrine, requiring that “this disqualifying characteristic should exhibit itself so manifestly as to override the broad statutory categories of eligible subject matter and the statutory context that directs primary attention on the patentability criteria of the rest of the Patent Act.”¹⁵

Avoiding categorical eligibility decisions would preserve patent claims for case-by-case validity evaluations under patentability standards such as novelty, non-obviousness, and adequacy of the disclosure,¹⁶ which these judges and scholars presumably believe impose better line-drawing criteria. Implicit in this approach is the view that section 101 largely duplicates patentability criteria that avoid “the issuance of bad patents”—bad in the sense of not being “really innovative”¹⁷—and that there is no field of scientific, technological, or other functional endeavor for which the patent system would categorically impede rather than promote

(1980) (citing, *inter alia*, *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 112–21 (1853); *Le Roy v. Tatham*, 55 U.S. (14 How.) 156, 175 (1853)).

10. “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter . . . may obtain a patent therefor . . .” 35 U.S.C. § 101 (2006).

11. John F. Duffy, *Rules and Standards on the Forefront of Patentability*, 51 WM. & MARY L. REV. 609, 613 (2009).

12. See Mark A. Lemley et al., *Life After Bilski*, 63 STAN. L. REV. 1315, 1317 (2011).

13. See *id.* at 1326–27; *cf.* Duffy, *supra* note 11, at 623 (arguing that if a class of patents complies with the non-obviousness requirement but nevertheless “discourages or impedes the development and spread of useful knowledge,” patentability doctrines rather than exclusions can be changed; in contrast, patent law has no remedy for the loss of patents and inventions that are excluded but would meet non-obviousness and other requirements). See generally Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575 (2003).

14. See, e.g., Michael Risch, *Everything Is Patentable*, 75 TENN. L. REV. 591, 591–93 (2008) [hereinafter Risch, *Everything Is Patentable*]; *cf.* Duffy, *supra* note 11, at 615 (arguing that unless courts can create eligibility rules that are both durable and sustainable they should abandon attempts to adopt crisp rules).

15. *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 868 (Fed. Cir. 2010).

16. See 35 U.S.C. §§ 102, 103(a), 112 (2006).

17. Stefania Fusco, *In re Bilski: A Conversation with Judge Randall Rader and a First Look at the BPAI's Cases*, 20 ALB. L.J. SCI. & TECH. 123, 145 (2010). See Michael Risch, *Forward to the Past*, 2009–2010 CATO SUP. CT. REV. 333, 348 [hereinafter Risch, *Forward to the Past*] (noting that, during the *Bilski* oral arguments, some Supreme Court Justices were concerned with eliminating “‘bad’ patents but keep[ing] ‘good’ patents”).

innovation.¹⁸ Because section 101 supposedly performs no unique or useful role in placing fences at the borders of the patent system, there is arguably no good reason to exclude from the patent system any field of endeavor dealing with practical and useful knowledge. Rather, the only productive role for eligibility is supposedly to exclude from the patent system claims that are clearly overly broad compared to the inventive contributions made by the claimants, that is, fundamental knowledge that has not yet been developed into *any* practical and useful application.¹⁹ Such claims, of course, are likely to fail under patentability criteria as well.²⁰

Significantly, these critics overstate the risk of exclusion errors and inadequately appreciate a fundamental aspect of current eligibility doctrine, as well as the historic justifications for it and the current benefits it supplies. This aspect renders reliance solely on patentability standards to constrain the patent system both inefficient and morally suspect. Thus, the Supreme Court in *Bilski* not only reaffirmed the existence of the categorical exclusions from eligibility, but also reiterated the long-standing requirement to treat such ineligible science, nature, and ideas as if they were already “a familiar part of the prior art,”²¹ even when they are newly discovered by the patent claimant. This legal fiction exists because such discoveries must remain free for all to use as “the ‘basic tools of scientific and technological work.’”²² Without prior-art treatment, the public domain of science, nature, and ideas could be consumed piecemeal, even if the new discoveries could not be swallowed whole. The patent system is not supposed to reward discoveries of basic science and at least some other kinds of human discoveries,²³ no matter

18. For example, Chief Judge Rader “strongly opposed the possibility” that the “patent system is not optimal to foster innovation in the newest technologies and that incentives for inventions in these fields should be found elsewhere.” Fusco, *supra* note 17, at 144; *see, e.g.*, Duffy, *supra* note 11, at 618 (noting the lack of empirical data and knowledge sufficient to create patentable subject-matter rules to exclude patents that “would *too often severely interfere with, or discourage*, development and the further spread of useful knowledge itself” (quoting *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124, 127–28 (2006) (Breyer, J., dissenting from dismissal of certiorari)) (internal quotation marks omitted)).

19. *See, e.g.*, Lemley et al., *supra* note 12, at 1328–29 (discussing “fundamental” ideas “reserved to society” that are the “building blocks of human thought” and noting that a “patent claim is ‘too broad’ in the sense that it encroaches upon society’s right to unfettered access” to such fundamental ideas); *id.* at 1329 (“The worry is not that an inventor controls the application of an abstract idea, but only that an inventor obtains rights over the idea itself.”).

20. *See, e.g.*, Risch, *Everything Is Patentable*, *supra*, note 14, at 595 (“[A]bandoning subject matter restrictions in favor of rigorous application of patentability requirements will not necessarily lead to more patents in controversial areas.”).

21. *Parker v. Flook*, 437 U.S. 584, 592 (1978); *see Bilski v. Kappos*, 130 S. Ct. 3218, 3230 (2010); *Parker*, 437 U.S. at 591 (citing *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948); *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 94 (1939)).

22. *Flook*, 437 U.S. at 591–92 (quoting *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)).

23. *See, e.g.*, Hector M. Holmes, Book Review, 45 HARV. L. REV. 1431, 1432 (1932) (reviewing

how much money, effort, creativity, and disclosure went into developing and disseminating that highly useful knowledge. Subject-matter eligibility doctrine polices precisely these distinctions regarding the kinds of activities that the intellectual property law system should and should not reward.²⁴ We should accept no substitutes.

Doctrinally, both eligibility and patentability continue to require an “invention,”²⁵ even when the claims might otherwise meet the language of the statutory categories or other requirements.²⁶ As a result of the prior-art status of categorically excluded science, nature, and ideas, the human creativity involved in discovering them does not contribute to assessing the nature, eligibility, *or* patentability of any claimed invention in an application.²⁷ Rather, patent claimants must invent, disclose, and claim some “other inventive concept” than a merely novel, physically limited application of a new discovery.²⁸ Stated differently, for an eligible and patentable invention to exist, there must be creativity *in the application* of excluded discoveries. Mere novelty of the application is not enough. For this reason, the Court in *Bilski* repeated language from

C.J. HAMSON, PATENT RIGHTS FOR SCIENTIFIC DISCOVERIES (1930)); *see also In re Alappat*, 33 F.3d 1526, 1553–54 (Fed. Cir. 1994) (en banc) (Archer, C.J., concurring in part, dissenting in part) (noting that embodying creative new music in a piano roll will not make the machine-readable music a patent-eligible invention). *But cf.* Peter Lee, Note, *Patents, Paradigm Shifts, and Progress in Biomedical Science*, 114 YALE L.J. 659, 661–63 (2004) (arguing that strong patent rights induce hypothesis generation to develop new scientific paradigms and that research tools raise the costs of exploring existing paradigms). *See generally* C.J. HAMSON, PATENT RIGHTS FOR SCIENTIFIC DISCOVERIES 20–29 (1930).

24. *See, e.g.*, Dennis S. Karjala, *Distinguishing Patent and Copyright Subject Matter*, 35 CONN. L. REV. 439, 440–41 (2003) (discussing omissions from copyright and patentable subject matter, sui generis protections, and dual coverage regarding things “thought to be worthy of protection”); *cf.* 17 U.S.C. § 102(a) (2006) (requiring “original works of authorship” and providing an illustrative list); Malla Pollack, *Towards a Feminist Theory of the Public Domain, or Rejecting the Gendered Scope of United States Copyrightable and Patentable Subject Matter*, 12 WM. & MARY J. WOMEN & L. 603, 604–05 (2006) (discussing historically gendered exclusions from patentable subject-matter protection).

25. *See* 35 U.S.C. §§ 101, 102, 103, 112 (2006). *See generally* Giles S. Rich, *Laying the Ghost of the “Invention” Requirement*, 1 APLA Q.J. 26 (1972–1973) (discussing efforts to adopt new terminology in the 1952 Act). Congress could easily have amended section 101 to refer to whoever applies for a patent (meeting other requirements), rather than to whoever invents. Email from Richard Stern to the IPProfs listserv (Aug. 3, 2011) (on file with the Author).

26. *Cf.* Emir Aly Crowne Mohammed, *What Is an Invention? A Review of the Literature on Patentable Subject Matter*, 15 RICH. J.L. & TECH. 1, 2 (2008) (“[Commentators have] questioned whether there still needs to be an invention in the first place, before one even considers its patentability.”); David Vaver, *Invention in Patent Law: A Review and a Modest Proposal*, 11 INT’L J.L. & INFO. TECH. 286, 289–90 (2003) (evaluating the meaning of invention by reference to international treaty norms).

27. *See, e.g.*, *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 115–16 (1853); *Morton v. N.Y. Eye Infirmary*, 17 F. Cas. 879, 881–82 (C.C.S.D.N.Y. 1862) (No. 9865).

28. *Parker v. Flook*, 437 U.S. 584, 594 (1978); *see Bilski v. Kappos*, 130 S. Ct. 3218, 3230 (2010) (“[O]nce that algorithm [wa]s assumed to be within the prior art, the application, *considered as a whole, contain[ed] no patentable invention.*” (emphasis added) (quoting *Flook*, 437 U.S. at 594) (internal quotation marks omitted)).

its most recent (and most claimant-friendly) eligibility case, *Diamond v. Diehr*, stating that “the prohibition against patenting abstract ideas ‘cannot be circumvented by attempting to limit the use . . . to a particular technological environment’ or [by] adding ‘insignificant postsolution activity.’”²⁹

Given the private benefits to be obtained from acquiring patents on novel applications of categorically excluded discoveries of science, nature, and ideas, we will increasingly confront claims that stretch the boundaries of our patent system.³⁰ Given this expansion and the Supreme Court’s continued reliance on patent eligibility doctrine, the lower courts, the U.S. Patent and Trademark Office (PTO), and the public will inevitably focus on this area of the law. So long as new discoveries of science, nature, and ideas are treated as if they were prior art, however, concerns over “preempting” all uses of these discoveries will remain incoherent.³¹ Similarly, without excluding any of the creativity involved in making the ineligible discovery, concerns regarding the overbreadth of claims relative to their “practical, real-world contribution”³² will continue to fail to supply an adequate theory of line drawing.³³

In contrast, recognizing the prior-art status of discoveries and the need for invention in the application explains the origins of the Court’s current doctrinal formulations for determining the eligibility of particular, physical, and scope-limited claims incorporating or applying ineligible discoveries.³⁴ These tests are whether claimed products have “markedly different characteristics”³⁵ and whether claimed processes reflect non-analogous uses.³⁶ Further, embracing prior-art status and line drawing will permit better tailoring of patent eligibility doctrine, as judges will be forced to clarify the kinds and degrees of creativity that

29. 130 S. Ct. at 3230 (quoting *Diamond v. Diehr*, 450 U.S. 175, 191–92 (1981)).

30. See, e.g., Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 591 (1999) (noting that due to expansion of patentable subject matter, “concerns about quality, especially in light of the data on overall volume, point to one conclusion: the patent system is in crisis”).

31. See *Bilski*, 130 S. Ct. at 3230 (noting earlier concerns that a patent “would wholly pre-empt the [discovery] and in practical effect would be a patent on the [discovery] itself”) (quoting *Gottschalk v. Benson*, 409 U.S. 63, 72 (1972)); *id.* at 3231 (allowing the claimed patent for “risk hedging would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea”).

32. Lemley et al., *supra* note 12, at 1317; see, e.g., Michael Risch, *New Uses for Patent Utility* 13–18 (July 27, 2010) (unpublished manuscript) [hereinafter Risch, *New Uses for Patent Utility*], available at http://www.law.berkeley.edu/files/bclt_IPSC2010_Risch.pdf.

33. Cf. Elizabeth I. Winston, *The Technological Edge*, AKRON J. INTELL. PROP. L. (forthcoming 2011) (manuscript at 8), available at <http://ssrn.com/abstract=1692836> (“[T]o draw a line between products of nature and man-made manipulations . . . requires analysis of the degree of sophistication required to produce the end product.”).

34. See *infra* Part I.B.

35. *Diamond v. Chakrabarty*, 447 U.S. 303, 310 (1980).

36. *Ansonia Brass & Copper Co. v. Elec. Supply Co.*, 144 U.S. 11, 18 (1892).

*should be required.*³⁷ As recognized by the four concurring Justices in *Bilski*, the majority wholly failed to explain why the relatively specific claims at issue, which applied the basic concept of hedging in a putatively novel and restrictive context, were abstract ideas.³⁸ The majority also failed to explain why the even more specific dependent claims, which limited the applications to commodities and energy markets and required the use of well-known data-gathering and calculation techniques as inputs to the method, added only “field of use” limits or “token postsolution components” that “did not make the concept patentable.”³⁹ The Federal Circuit’s en banc approach fared no better. It improperly adopted the Supreme Court’s “machine-or-transformation test as the sole test for what constitutes [an eligible] ‘process’ (as opposed to just an important and useful clue),”⁴⁰ and failed to explain the kind and degree of transformation that was necessary and sufficient for eligibility.⁴¹

Line drawing in the medical and biotechnological fields also will remain unclear and will appear unprincipled without recognition of the prior-art status of new scientific discoveries.⁴² For example, on remand from the Supreme Court following *Bilski*, the Federal Circuit in *Prometheus Laboratories* distinguished the “essence” of the human medical treatment claims at issue as physically “transformative” from the “mere[] data-gathering steps” or “insignificant extra-solution activity” of a clinical diagnostic claim that the Federal Circuit had earlier found to be ineligible.⁴³ But the decision failed to explain why the “‘gist’ or ‘heart’” or “‘point of novelty’”⁴⁴ of the claimed invention lay in the physically

37. Cf. John R. Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139, 1142 (1999) (“[O]ur long-held sense of the reach of the patent system . . .”).

38. *Bilski v. Kappos*, 130 S. Ct. 3218, 3231, 3236 (2010) (Stevens, J., concurring).

39. *Id.* at 3231.

40. *Id.* at 3226; see also *id.* at 3227 (quoting *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972)); *In re Bilski*, 545 F.3d 943, 954–55 (Fed. Cir. 2008) (en banc).

41. See *In re Bilski*, 545 F.3d at 963–64.

42. See, e.g., Joshua D. Sarnoff, *The Current State of Patent Eligibility of Medical and Biotechnology Inventions in the United States*, in INTELLECTUAL PROPERTY AND EMERGING BIOTECHNOLOGIES (Matthew Rimmer & Alison McLennan eds., forthcoming 2011); Joshua D. Sarnoff, *Patent Eligible Medical and Biotechnology Inventions After Bilski, Prometheus, and Myriad*, 19 TEX. INTEL. PROP. L.J. 393, 395 (2011) [hereinafter Sarnoff, *Medical and Biotechnology Inventions*].

43. *Prometheus Labs., Inc. v. Mayo Collaborative Servs.*, 628 F.3d 1347, 1357–58 (Fed. Cir. 2010) (internal quotation marks omitted) (distinguishing *In re Grams*, 888 F.2d 835 (Fed. Cir. 1989)), *cert. granted*, 131 S. Ct. 3027 (2011); see also Christopher M. Holman, *On Remand, Federal Circuit (Once Again) Decides Prometheus v. Mayo in Favor of Patent Eligibility for Methods of Treatment and Diagnostic Tests*, HOLMAN’S BIOTECH IP BLOG (Dec. 17, 2010), <http://holmansbiotechblog.blogspot.com/2010/12/on-remand-federal-circuit-once-again.html> (arguing that the panel decision’s attempt to distinguish *Grams* was “less than entirely convincing”).

44. See, e.g., Mark A. Lemley, *Point of Novelty 2* (Stanford Pub. Law, Working Paper No. 1735045) (quoting *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 875 (Fed. Cir. 1985)) (citing Oskar Liivak, *Rescuing the Invention from the Cult of the Claim 1* (Feb. 24, 2010) (unpublished manuscript), available at <http://ssrn.com/abstract=1769270>), available at <http://ssrn.com/abstract=1735045>; see also Kevin E. Collins, *Semiotics 101: Taking the Printed Matter Doctrine Seriously*, 85 IND. L.J. 1379, 1381

transformative application and not in the discovered correlation employed by it. The decision also held that the treatment claims at issue did “not preempt all uses of the natural correlations; they utilize[d] them in a series of specific steps,” because other drugs might be found that purportedly employed the same correlations.⁴⁵ The decision thus failed to explain why these steps were not merely insignificant extra-solution activity that similarly prevents specific uses of natural correlations from preempting other uses.⁴⁶ It remains to be seen whether the Supreme Court will provide any more convincing explanations for its pending decision in *Prometheus Laboratories* or will find any constitutional restrictions on creating property from the public domain, particularly in light of the pending challenge in *Golan v. Holder*.⁴⁷

Part I of this Article briefly describes the two-hundred-year history of patentable subject-matter eligibility doctrine in the United States, arising from the English experience;⁴⁸ discusses the development of the current doctrinal standards for eligibility; and explains the origins of the categorical exclusions and their prior-art treatment in religious and deontological moral commitments.⁴⁹ Part II discusses why alternative approaches to eligibility focusing on claim scope or physicality will remain misguided, derivative, and inadequate to assess inventive creativity;⁵⁰ describes how prior-art treatment of excluded discoveries

(2010) (noting that the printed matter doctrine applies a point-of-novelty approach).

45. *Prometheus Labs., Inc.*, 628 F.3d at 1355. The court, however, failed to recognize that the correlations applied to the observed and claimed thiopurine drugs; other drugs generating the same metabolites would be the subject of *different*, unclaimed natural correlations. See Sarnoff, *Medical and Biotechnology Inventions*, *supra* note 42, at 404.

46. Cf. Holman, *supra* note 43 (suggesting that claim scope was a plausible distinction of *Grans*, but “would be better addressed using the enablement requirement rather than patent eligibility”).

47. 609 F.3d 1076 (10th Cir. 2010), *cert. granted*, 131 S. Ct. 1600 (2011). Various constitutional innovation policies and utilitarian and deontological moral concerns may justify different kinds of line drawing for subject-matter eligibility. See, e.g., Brief of Amici Curiae Ten Law Professors in Support of Appellee Director of the United States Patent & Trademark Office at 6–12, *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (en banc) (No. 2007-1130). See generally EDWARD C. WALTERSCHEID, *THE NATURE OF THE INTELLECTUAL PROPERTY CLAUSE: A STUDY IN HISTORICAL PERSPECTIVE* (2002). Further, the case law history reveals that ideas should be considered abstract when they constitute “functional properties on which claimed inventions operate or results to be achieved by employing those properties.” Brief of Eleven Law Professors and AARP as Amici Curiae in Support of Respondent at 23–24, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (No. 08-964) (citing *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. (20 Wall.) 498, 507 (1874)). See generally Pamela Samuelson & Jason Schultz, “Clues” for Determining Whether Business and Service Innovations Are Unpatentable Abstract Ideas, 15 LEWIS & CLARK L. REV. 109 (2011).

48. A more detailed history is provided in JOSHUA D. SARNOFF, *PATENTS AND MORALITY: RELIGION, SCIENCE, NATURE, AND THE LAW* (forthcoming).

49. See *infra* Part I; see also I WILLIAM C. ROBINSON, *THE LAW OF PATENTS FOR USEFUL INVENTIONS* § 25 (1890).

50. Cf. Risch, *New Uses for Patent Utility*, *supra* note 32, at 13–18 (discussing practical utility as a substitute for eligibility criteria—specifically for distinguishing abstract from nonabstract ideas, laws of nature from patentable applications, and natural products and their relationship to inherency and public benefit) (citing, inter alia, Michael Risch, *Reinventing Usefulness*, 2010 BYU L. Rev. 1195

compares to other jurisdictions' approaches and better protects against claims that would effectively block or dominate subsequent applications of excluded subject matter; and explains the proper relationship between eligibility and various patentability doctrines.⁵¹ Part III discusses many efficiency and some moral benefits of relying on categorical, threshold eligibility determinations so long as science, nature, and ideas are treated as prior art. Part III also explains why we should not abandon this long-standing and highly successful approach to protecting the public domain,⁵² sacrifice these utilitarian benefits, or reject the deontological moral norms that support keeping the public domain free from private patent property rights.⁵³ These moral norms include valuing our common heritage,⁵⁴ protecting freedom of thought and expressive communication,⁵⁵ preserving bodily integrity and personality,⁵⁶ and maintaining certain activities or things free from the patent system or subject to certain kinds

[hereinafter Risch, *Reinventing Usefulness*]).

51. See *infra* Part II; cf. Donald S. Chisum, *Weeds and Seeds in the Supreme Court's Business Method Patents Decision: New Directions for Regulating Patent Scope*, 15 LEWIS & CLARK L. REV. 11, 13 (2011) (discussing *Bilski* and the Court's distinction of what Chisum calls the "Invention Achievement Inquiry" and distinguishing it from the "Protection Scope Inquiry").

52. *But cf.* Lemley, *supra* note 44, at 33–34 (suggesting that the *Flook* approach of dissecting novelty and of excluding discoveries from inventive contributions was a new and short-lived development, and arguing that it was properly rejected in *Diehr* for excluding too many useful applications from the patent system).

53. See *infra* Part III; see also, e.g., NUFFIELD COUNCIL ON BIOETHICS, THE ETHICS OF PATENTING DNA 21–23 (2002) (discussing moral concerns with owning genetic materials, including views that they are the common heritage of humanity; inalienable, public property; and discoveries rather than inventions); cf. Thomas, *supra* note 37, at 1141 ("[T]he patent eligibility inquiry has been reduced to one of mere utility. This trend is a disturbing one. . . ."). *But cf.* Duffy, *supra* note 11, at 618 ("[T]he patentable subject matter doctrines are based not on a moral or ethical decision about the desirability of patents as an end in themselves but on empirical estimation[s] of [utilitarian innovation policy]."). See generally THE FUTURE OF THE PUBLIC DOMAIN: IDENTIFYING THE COMMONS IN INFORMATION LAW (Lucie Guibault & P. Bernt Hugenholtz eds., 2006); LOUIS KAPLOW & STEVEN SHAVELL, FAIRNESS VERSUS WELFARE (2002); Conference: *The Public Domain*, 66 L. & CONTEMP. PROBS., Winter/Spring 2003.

54. See, e.g., JASPER A. BOVENBERG, PROPERTY RIGHTS IN BLOOD, GENES, AND DATA: NATURALLY YOURS? 39–49 (2006); Keith Aoki & Kennedy Luvai, *Reclaiming "Common Heritage" Treatment in the International Plant Genetic Resources Regime Complex*, 2007 MICH. ST. L. REV. 35, 36–41.

55. See, e.g., *Ass'n for Molecular Pathology v. USPTO*, 702 F. Supp. 2d 181, 237–38 (S.D.N.Y. 2010) (applying the doctrine of constitutional avoidance to the plaintiffs' First Amendment claims); Brief of the Software Freedom Law Center as Amicus Curiae in Support of Respondent at 11–14, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (No. 08-964); Michael Crichton, *This Essay Breaks the Law*, N.Y. TIMES, Mar. 19, 2006, at WK13 (discussing *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124 (2006) (per curiam)).

56. See, e.g., *Ass'n for Molecular Pathology*, 702 F. Supp. 2d at 206–11; 148 CONG. REC. S5579 (daily ed. June 14, 2002) (statement of Sen. Edward Kennedy); Brief for the American Medical Association et al. as Amici Curiae in Support of Petitioner at 13, *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124 (2006) (No. 04-607); *Legislative Updates*, NAT'L INST. HEALTH, OFF. LEGIS. & POL'Y ANALYSIS (Feb. 3, 2011), <http://olpa.od.nih.gov/legislation/107/pendinglegislation/7cloning.asp>.

of equal treatment, as for tax planning methods and human organisms⁵⁷ or sporting activities.⁵⁸

The need to preserve a robust public domain of science, nature, and ideas from encroachment by the patent system⁵⁹ thus explains both the need for continuing their prior-art treatment and why we cannot and should not “see the wisdom of abandoning line drawing.”⁶⁰ To extend Fritz Machlup’s famous statement regarding arguments to abandon the patent system, it would be “irresponsible, on the basis of our present knowledge, to recommend abolishing” the historic protection for science, nature, and ideas, provided by prior-art treatment in eligibility doctrine and by the requirement for invention in the application.⁶¹ The Article concludes with a brief exhortation to celebrate rather than to reluctantly embrace categorical exclusions of patentable subject-matter, their prior-art status, and the line drawing that eligibility determinations require, to better protect the public domain of science, nature, and ideas while simultaneously improving the patent system.

I. A VERY BRIEF HISTORY OF SUBJECT-MATTER EXCLUSIONS AND THE REQUIREMENT FOR “INVENTION”

A. EARLY APPROACHES

In England in 1795, in the famous James Watt steam engine case, *Boulton v. Bull*, Chief Judge Eyre expressed the unanimous view that “[u]ndoubtedly there can be no patent for a *mere principle*.”⁶² In contrast, it was acknowledged that patents could issue for the invention of “manufactures” under the 1623 English Statute of Monopolies,⁶³ which “applied not only to things made, but to the practice of making, to principles carried into practice in a new manner, to new results of principles carried into practice.”⁶⁴ The critical issue for the case, on which the judges split, was whether patents could issue for practical methods

57. See, e.g., Leahy-Smith America Invents Act, Pub. L. No. 112-29, §§ 14(a), 33(a), 125 Stat. 284, 327, 340 (2011).

58. See, e.g., Gerard N. Magliocca, *Patenting the Curve Ball: Business Methods and Industry Norms*, 2009 BYU L. REV. 875, 876–77; Jeffrey A. Smith, *It’s Your Move—No It’s Not! The Application of Patent Law to Sports Moves*, 70 U. COLO. L. REV. 1051, 1082–83 (1999).

59. *Bilski v. Kappos*, 130 S. Ct. 3218, 3227 (2010) (“[Prior eligibility frameworks] risk obscuring the larger object of securing patents for valuable inventions *without transgressing the public domain*.” (emphasis added)).

60. Risch, *Forward to the Past*, *supra* note 17, at 365.

61. FRITZ MACHLUP, AN ECONOMIC REVIEW OF THE PATENT SYSTEM, 85TH CONG., STUDY OF THE SUBCOMMITTEE ON PATENTS, TRADEMARKS, AND COPYRIGHTS OF THE COMMITTEE ON THE JUDICIARY 80 (1958).

62. (1795) 126 Eng. Rep. 651, 667 (opinion of Lord Eyre, C.J.) (emphasis added); see *id.* at 662 (opinion of Buller, J.) (“[A]n idea or a principle alone would not support the patent.”).

63. Statute of Monopolies, 1623, 21 Jac. 1, c. 3, § 6.

64. *Boulton*, 126 Eng. Rep. at 665.

(processes) of applying scientific principles that were disembodied from any particular arrangement of machinery through which those principles operated, and for which arrangements it was acknowledged that a patent could issue; that is, whether patents could issue for pure method claims divorced from particular structural combinations or even from specific contexts.⁶⁵ Stated differently, ineligible *mere* principles—which constituted either scientific discoveries or abstract ideas—were distinguished from principles of *invention*, and it was unclear at the time whether such *inventive* principles could include pure methods.

At the end of the eighteenth century, the United States Constitution vested in Congress the power to grant exclusive rights to “Inventors” for their “Discoveries.”⁶⁶ As discussed in more detail below, discoveries of *inventors* had a particular meaning, distinct from discoveries of science and nature and thus from the mere principles discussed in *Boulton*.⁶⁷ In the terminology of the time, scientific and natural discoveries were the province of “natural philosophy.”⁶⁸ The exclusion from patent eligibility for mere principles was also well recognized in the United States: “[A] patent may be for a new and useful art; but it must be practical, it must be applicable and refer[a]ble to something which may prove it to be useful. *A mere abstract principle is unsusceptible of appropriation by a patent.*”⁶⁹

As Thomas Jefferson famously explained in 1813, ideas are nonrivalrous and thus are not proper subjects of exclusive rights at natural law:

65. Compare *Boulton*, 126 Eng. Rep. at 667 (Lord Eyre, C.J.) and *id.* at 659 (Rooke, J.), with *id.* at 482 (Heath, J.) and *id.* at 662, 664–65 (Buller, J.).

66. U.S. CONST. art. I, § 8, cl. 8.

67. See WALTERSCHEID, *supra* note 47, at 125–33 (citing sources and discussing historic difference in meaning between “Science” and “Useful Arts”); cf. *Parker v. Flook*, 437 U.S. 584, 593 (1978) (“The rule that the discovery of a law of nature cannot be patented rests . . . on the more fundamental understanding that they are not the kind of ‘discoveries’ that the statute was enacted to protect.”); Amicus Curiae Brief of Center for Advanced Study and Research in Intellectual Property (“CASRIP”) of the University of Washington School of Law, and of CASRIP Research Affiliate Scholars, In Support of Affirmance of the Judgment in Favor of Respondent at 11 n.9, 25 n.44, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (No. 08-964) [hereinafter CASRIP *Bilski* Brief] (arguing that these terms express “essentially the same limitation,” discussing limits on the meaning of “useful arts,” and noting that “basic principles are neither *Arts* nor *Discoveries of Inventors*”); WALTERSCHEID, *supra* note 47, at 348–57 (arguing that “Discoveries [of] Inventors” must be read in conjunction with the object of “promotion . . . of useful arts” and interpreting such terms by reference to developing English practice in *Boulton* and its limits on patents for principles of nature).

68. See, e.g., JOHNSON’S DICTIONARY OF THE ENGLISH LANGUAGE, IN MINIATURE 169 (W.P. & L. Blake Pubs., 1st Am. ed. 1804) (“[‘Philosophy’ is] knowledge natural or moral, the hypothesis upon which natural effects are explained”); WILLIAM SHAKESPEARE, *HAMLET* act I, v. 166–67, n.167 (Houghton Mifflin 1974) (defining “philosophy” as “natural philosophy, science” in regard to Hamlet’s famous line to Horatio).

69. *Evans v. Eaton*, 8 F. Cas. 846, 852 (C.C.D. Pa. 1816) (No. 4559) (emphasis added).

[Ideas are] incapable of confinement or exclusive appropriation. *Inventions then cannot, in nature, be a subject of property.* Society may give an exclusive right to the profits arising from them, as an encouragement to men to pursue ideas which may produce utility, but this may or may not be done, according to the will and convenience of the society, without claim or complaint from anybody.⁷⁰

Further, only some kinds of ideas could be made, by law, the proper subject of exclusive private property: discoveries of inventors that were not merely abstract principles, scientific principles, or naturally occurring materials, which subsequent cases described as “laws of nature, physical phenomena, and abstract ideas.”⁷¹

In 1790, pursuant to the patent power vested by the Constitution, Congress created a Patent Board and authorized it to grant patents to inventors who had “invented or discovered any useful art, manufacture, engine, machine, or device, or any improvement therein.”⁷² The contemporaneous meaning of the term “useful art,” in both the Constitution and the statute, is subject to significant dispute,⁷³ but to some extent the statute must have reflected that the exclusive rights contemplated by the Constitution (including copyrights) were intended to “promote the Progress of Science and useful Arts.”⁷⁴ Significantly, the Patent Board adopted various restrictions on what qualified as a statutory “invention” or “discovery,” in particular that the application of a machine to a new use, changes in materials of construction, changes of form, and the use of previously known implements in combination (such as using a saw and axe together) were not patentable.⁷⁵ Implicit in this approach was the belief that the public’s knowledge of a machine entitled it to “any use of which it is susceptible.”⁷⁶ Providing exclusive rights for applying existing machines to new uses or to new materials, a

70. Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), in THOMAS JEFFERSON, *THE PORTABLE THOMAS JEFFERSON* 525, 530 (Merrill D. Peterson ed., Penguin Books 1977) (1975) [hereinafter *Jefferson Letter*] (emphasis added); cf. *Int’l News Serv. v. Associated Press*, 248 U.S. 215, 250 (1918) (Brandeis, J., dissenting) (“[T]he noblest of human productions—knowledge, truths ascertained, conceptions, and ideas—become, after voluntary communication . . . free as the air to common use.”).

71. *Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010) (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)).

72. Act of Apr. 10, 1790, ch. 7, § 1, 1 Stat. 109, 110.

73. See *supra* note 67 and accompanying text. Compare, e.g., NOAH WEBSTER, *AMERICAN DICTIONARY OF THE ENGLISH LANGUAGE* (1st ed. 1828) (distinguishing useful arts from other arts), with *Dolbear v. Am. Bell Tel. Co.*, 126 U.S. 1, 533 (1888) (“[U]seful arts [are] arts which may be used to advantage.”).

74. U.S. CONST. art. I, § 8, cl. 8; see WALTERSCHEID, *supra* note 47, at 116–17 (arguing that the usual interpretation is that the patent power was restricted to promoting the useful arts, and the copyright power to promoting science, given the balanced composition style adopted by the Framers).

75. See *Graham v. John Deere Co.*, 383 U.S. 1, 9, 10 n.3 (1966); *Jefferson Letter*, *supra* note 70, at 531–32.

76. *Jefferson Letter*, *supra* note 70, at 531.

patent would take this right from the public and give it to a monopolist.⁷⁷ Similarly, mere changes of form or of materials for constructing machines would simply apply the same inventive principle already known by the public, and thus would deprive the public of opportunities to make and use machines already within its grasp, even if they had not yet been constructed.⁷⁸ As Thomas Jefferson colorfully explained, “But for this rule, all the changes of fashion in dress would have been under the tax of patentees.”⁷⁹

In 1793, Congress codified at least one of the Board’s negative rules of patentability,⁸⁰ specifying that “simply changing the form or the proportions of any machine, or composition of matter, in any degree, shall not be deemed a *discovery*.”⁸¹ Congress thus excluded from *patent eligibility* as not “inventions” or “discoveries” things that, although novel, the Board had treated as not *patentable* because they were obvious due to constructive public possession.⁸² Further, by excluding changes of form, proportions, or composition, Congress effectively prompted courts to restrict patents to new principles of invention employed by particular machines.⁸³ For similar machines to be patentable, they would have to operate according to *different* principles.⁸⁴

Nevertheless, Congress in 1793 also expanded patent-eligible subject matter to compositions of matter, adopting what is essentially the same terminology as in the modern statute, though the term “art” was replaced in 1952 by the term “process”:⁸⁵ “any new and useful art, machine, manufacture or composition of matter.”⁸⁶ Although the contemporaneous meaning of “art” and “useful art” is not entirely clear,⁸⁷

77. *Id.*

78. *See id.*; *see also* *Brown v. Piper*, 91 U.S. 37, 41 (1875).

79. Jefferson Letter, *supra* note 70, at 531.

80. The precise origins of the relevant provision are in doubt. Joseph Barnes proposed the language to Congress, *see* Edward C. Walterscheid, *The Hotchkiss Unobviousness Standard: Early Judicial Activism in the Patent Law*, 13 J. INTELL. PROP. L. 103, 109 (2005), but the same language had previously been enacted in the French Patent Act of 1791, *see* John F. Duffy, *Inventing Invention: A Case Study of Legal Innovation*, 86 TEX. L. REV. 1, 36 (2007).

81. Act of Feb. 21, 1793, ch. 11, § 2, 1 Stat. 318, 321 (emphasis added).

82. *See* Duffy, *supra* note 11, at 624–25 (noting appropriate treatment at the time as an eligibility issue).

83. *See, e.g.*, *Evans v. Eaton*, 20 U.S. (7 Wheat.) 356, 431 (1822); *Evans v. Eaton*, 8 F. Cas. 846, 852 (C.C.D. Pa. 1816) (No. 4559), *rev'd on other grounds*, 16 U.S. (3 Wheat.) 454 (1818); *see also* Walterscheid, *supra* note 80, at 108–15 (discussing doctrinal changes resulting from the amended statutory language).

84. *See* Joshua D. Sarnoff, *The Historic and Modern Doctrines of Equivalents and Claiming the Future, Part I (1790–1870)*, 87 J. PAT. & TRADEMARK OFF. SOC'Y 371, 386–91 (2005) (discussing principles of invention and conceptual problems regarding their level of generality under the 1793 Act, which required different principles for patent eligibility, and noting changes to claiming practices resulting from *Evans*, prior to their codification in the 1836 Act).

85. 35 U.S.C. § 101 (2006).

86. Act of Feb. 21, 1793, ch. 11, § 1, 1 Stat. 318, 319.

87. *See supra* notes 67, 73 and accompanying text.

at the end of the eighteenth century, pure method patents—methods claiming all future applications and not merely those substantially similar to the disclosed implementing machinery and their equivalents⁸⁸—were ineligible for protection and remained so until the late nineteenth century.⁸⁹ Nevertheless, there is a distinction between pure methods not limited to specific machines on the one hand, and the scientific principles on which they operate on the other. This distinction is critical to understand, as it distinguishes between the categorically ineligible subject matter and, at least potentially, eligible applications thereof.

Under the 1836 Act, which preserved the statutory eligibility categories of the 1793 Act,⁹⁰ the Supreme Court observed in the seminal case of *O'Reilly v. Morse* that newly discovered scientific principles simply were not patent eligible; only particular configurations of machinery applying those principles were.⁹¹ Discussing a then-recent English case,⁹² the Court noted:

Neilson claimed no particular mode of constructing the receptacle, or of heating it. . . . [T]he court at first doubted, whether it was a patent for any thing more than the discovery that hot air would promote the ignition of fuel better than cold. And if this had been the construction, the court, it appears, would have held his patent to be void; *because the discovery of a principle in natural philosophy or physical science, is not patentable.*

But after much consideration, *it was finally decided that this principle must be regarded as well known, and that the plaintiff had invented a mechanical mode of applying it to furnaces; and that his invention consisted in interposing a heated receptacle, between the blower and the furnace, and by this means heating the air after it left the blower, and before it was thrown into the fire. . . .*

Undoubtedly, the principle that hot air will promote the ignition of fuel better than cold, was embodied in this machine. *But the patent was not supported because this principle was embodied in it. . . .*

*. . . If the Court of Exchequer had said that Neilson's patent was for the [scientific] discovery, that hot air would promote ignition better than cold, and that he had an exclusive right to use it for that purpose, there might, perhaps, have been some reason to rely upon it. But the court emphatically denied this right to such a patent.*⁹³

88. See *Corning v. Burden*, 56 U.S. (15 How.) 252, 268–69 (1853); *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 115–16 (1853); see also *Evans v. Eaton*, 16 U.S. (3 Wheat.) 454, 517 (1818); *Howe v. Abbott*, 12 F. Cas. 656, 657–58 (C.C.D. Mass. 1842) (No. 6766); *Wyeth v. Stone*, 30 F. Cas. 723, 727 (C.C.D. Mass. 1840) (No. 18,107); *Barrett v. Hall*, 2 F. Cas. 914, 923 (C.C.D. Mass. 1818) (No. 1047); *Lowell v. Lewis*, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817) (No. 8568).

89. See *Cochrane v. Deener*, 94 U.S. 780, 787–88 (1876); Brief of Eleven Law Professors and AARP as Amici Curiae in Support of Respondent at 18–19, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (No. 08-964).

90. Act of July 4, 1836, ch. 357, § 6, 5 Stat. 117, 119.

91. 56 U.S. (15 How.) at 115–16.

92. *Neilson v. Harford*, (1841) 151 Eng. Rep. 1266, 1267–68.

93. *Morse*, 56 U.S. (15 How.) at 115–16 (emphasis added).

Two aspects of this discussion from the *Morse* decision are critical. First, the basis for finding patentability was *not* the fact that the machine embodied (that is, applied in a novel, concrete, and particularized manner) a newly discovered scientific principle. Rather, what grounded patent eligibility was the *inventive* (in other words, creative as well as novel) *application* of that principle reflected in the *particular mechanical mode* invented by Neilson or Morse. Stated differently, the principle of *invention* (the specified “means . . . to produce the result or effect”⁹⁴) capable of being patented by Neilson or Morse was a principle in addition to that of the discovery of the natural properties of combustion or electromagnetism; it was a principle regarding the configuration of machinery or the arranged steps of a specific process, that employed the scientific discovery, and not merely the application of the discovery to a new use.

As stated a year earlier in *Le Roy v. Tatham*,

In all such cases, the processes used to extract, modify, and concentrate natural agencies, constitute the invention. The elements of the power exist; *the invention is not in discovering them, but in applying them to useful objects.*

. . . .

In the case of *Bean v. Smallwood* . . . Mr. Justice Story said, “He (the patentee) says that the same apparatus, stated in this last claim, has been long in use, and applied, if not to chairs, at least in other machines, to purposes of a similar nature. If this be so, *then the invention is not new, but at most is an old invention . . . applied to a new purpose. . . . If it is old and well known, and applied only to a new purpose, that does not make it patentable.*”⁹⁵

Second and more importantly, merely applying the new scientific discovery to exploit its properties in a noninventive, but novel, manner *could not* have justified a patent. This is because the Court in *Morse* had held that even a newly discovered scientific principle “must be regarded as well known.”⁹⁶ As *Le Roy* had indicated, there would be no eligible invention in *merely* applying the (fictionally) well-known scientific principle to a “new purpose.”⁹⁷ Although the 1836 Act had eliminated the 1793 Act’s language stating that changes to form or proportions were not discoveries,⁹⁸ the courts had continued to require a new “principle of invention” to establish patent eligibility.⁹⁹ Invention—both for patent

94. *Id.* at 119.

95. 55 U.S. (14 How.) 156, 175–77 (1852) (emphasis added) (citation omitted) (quoting *Bean v. Smallwood*, 2 F. Cas. 1142 (C.C.D. Mass. 1843) (No. 1173)).

96. 56 U.S. (15 How.) at 116.

97. 55 U.S. (14 How.) at 177.

98. See Act of July 4, 1836, ch. 357, § 6, 5 Stat. 117, 119; Act of Feb. 21, 1793, ch. 11, § 1, 1 Stat. 318, 319.

99. See Sarnoff, *supra* note 84, at 387–89; Edward C. Walterscheid, *Novelty and the Hotchkiss Standard*, 20 FED. CIR. B.J. 219, 255 (2010).

eligibility *and* for patentability—thus required *creativity in the application* of scientific discoveries; that is, more than merely applying the discoveries to a new use, as reflected in the particular machinery or method steps described and claimed in the patent.¹⁰⁰

B. DEVELOPING THE REQUIREMENT FOR INVENTION IN THE APPLICATION FOR NEW THINGS AND NEW USES

I. *Requirements for Invention, Dissimilarity, and Additional Creativity in the Means of Application*

Three years before *Morse*, in *Hotchkiss v. Greenwood*, the Supreme Court introduced the requirement that the level of creativity necessary for an eligible and patentable “invention” reflect more than the “ingenuity or skill . . . possessed by an ordinary mechanic” to achieve a new result.¹⁰¹ Invention, like the earlier statutory exclusion from eligible discoveries, required “ingenuity . . . [beyond] judgment and skill in the selection and adaptation of the materials in the manufacture of the instrument for the purposes intended.”¹⁰² *Hotchkiss* thus stands for, among other things, the principle that the statutory *eligibility* categories (the one at issue being manufactures), did not include many novel creations otherwise falling within the statutory categories of subject matter, as they were not considered patentable *inventions*.¹⁰³

The *Hotchkiss* Court, however, did not make clear whether it believed this interpreted or created limitation on eligibility was a constitutional requirement, a statutory construction based on the inherent meaning of the statutory term “invention,” or a judicially adopted limitation.¹⁰⁴ The Court also did not make clear the kind and degree of ingenuity required for invention, other than that it was more than mechanical skill.¹⁰⁵ But the Court did clearly indicate that the very concept of an eligible and potentially patentable “invention” (which is the subject of the patent laws) requires *both* novelty and sufficient creativity to generate new *conceptual* things; mere novel variations of existing things or novel combinations of them that produced better

100. See, e.g., Samuelson & Schultz, *supra* note 47, at 119–20 (citing Giles S. Rich, *Principles of Patentability*, 28 GEO. WASH. L. REV. 393, 393–94 (1960)).

101. 52 U.S. (11 How.) 248, 265 (1850).

102. *Id.* at 266.

103. Cf. *Dunbar v. Myers*, 94 U.S. 187, 199 (1876) (“[T]he substitution of equivalents, doing the same thing as the *original invention* by substantially the same means, is *not such an invention as will sustain a patent* . . .”) (emphasis added) (citing *Smith v. Nichols*, 88 U.S. (21 Wall.) 112, 119 (1874)).

104. Cf. *Walterscheid*, *supra* note 80, 124–26 (2005) (arguing that the Court in *Graham v. John Deere Co.*, 383 U.S. 1 (1966), interpreted the Constitution to impose a requirement of inventive creativity beyond novelty, but did not justify the specific requirement of obviousness on this requirement).

105. See *Walterscheid*, *supra* note 99, at 262–63.

results were not inventions.¹⁰⁶ The Court thus suggested in dicta that a substituted material that resulted in changing an old manufacture into a different thing (“resulted in a new and useful article”) would be “the proper subject of a patent.”¹⁰⁷

Difficult line-drawing decisions are required to determine when a qualitatively or categorically new thing has been created, rather than just a novel variation of an existing thing. Similarity and difference are notoriously difficult to pin down theoretically, and may follow, rather than precede, the policy judgments that specify the relevant distinguishing criteria.¹⁰⁸ Accordingly, theoretically undetermined choices must be made to assess the nature and sufficiency of invention (in other words, the kind and degree of required creativity) of claimed new things derived from pre-existing (particularly naturally occurring) things, or of claimed new means for applying preexisting knowledge, particularly scientific principles or laws of nature.

In 1887 in *Hartranft v. Wiegmann*, the Supreme Court articulated a standard, in the context of import duties rather than patent law, for when a new “manufacture” had been created from natural materials.¹⁰⁹ To qualify as a manufacture required “a new and different article, having a *distinctive* name, character, or use The application of labor to an article, either by hand or by mechanism, does not make the article necessarily a manufactured article”¹¹⁰ The Court in *Hartranft* thus distinguished merely novel creations from manufactures, and thereby imposed a requirement for line drawing notwithstanding the human or machine labor applied to improve the natural thing.¹¹¹ But understandably, given that it was not a patent case, the Court did not specify how to distinguish for patent eligibility purposes the similarity or difference of newly created things from natural things.

Since *Hartranft*, the Court has not been terribly clear in specifying how, why, and on what criteria to draw the relevant lines between patent-eligible new things or new processes on the one hand, and the ineligible products of nature they derive from or the laws of nature or abstract ideas they apply on the other.¹¹² Nor is the terminology of

106. See *Hotchkiss*, 52 U.S. (11 How.) at 265–66.

107. See *id.* at 265.

108. See, e.g., *Similarity*, in M.I.T. ENCYCLOPEDIA OF THE COGNITIVE SCIENCES 757 (Robert A. Wilson & Frank C. Keil eds., 2001) (similarity judgments are “totally unconstrained” without reference to a property “that performs all of the explanatory work”) (citing, inter alia, Nelson Goodman, *Seven Strictures on Similarity*, in PROBLEMS AND PROJECTS (1972)); cf. FERDINAND DE SAUSSURE, COURSE IN GENERAL LINGUISTICS 115 (Roy Harris trans., Open Court 1986) (1913); WILLIAM JAMES, THE PRINCIPLES OF PSYCHOLOGY 459 (Dover Press 1950) (1890).

109. 121 U.S. 609, 615 (1887).

110. *Id.*

111. *Id.* (discussing scouring of wool and ginning of cotton).

112. See, e.g., *Diamond v. Chakrabarty*, 447 U.S. 303, 310 (1980) (distinguishing Funk Bros. Seed

“discovery” or “invention” particularly helpful, given that the Constitution and statute apply conjointly or circularly to both terms.¹¹³ Rather, the Court has continued to focus its distinctions on the belief that a claimed application of a newly identified discovery is not a patent-eligible invention simply because the discovery is applied to a particular and new use.¹¹⁴ As stated by Justice Nelson in 1862, in the lower court case of *Morton v. New York Eye Infirmary*, a new *and additional* principle to such mere application of a discovery was required for invention:

A discovery of a new principle, force, or law operating, or which can be made to operate, on matter, will not entitle the discoverer to a patent. It is only where the explorer has gone beyond the mere domain of discovery, and has laid hold of the new principle, force, or law, and *connected it with some particular medium or mechanical contrivance by which, or through which, it acts on the material world*, that he can secure the exclusive control of it under the patent laws. He then controls his discovery *through the means by which he has brought it into practical action, or their equivalent, and only through them*. It is *then an invention*, although it *embraces* a discovery. Sever the force or principle discovered from the means or mechanism through which he has brought it into the domain of invention, and it immediately falls out of that domain and eludes his grasp. It is then a naked discovery, and not an invention.¹¹⁵

2. *Expanding Eligibility to Pure Methods, Application to Machines or Transformations, and Preemption by the Principle of the Invention*

In 1877 in *Cochrane v. Deener*, the Court first indicated—under the 1870 Act, which did not change the patent eligibility criteria from the 1836 Act¹¹⁶—that pure methods could be considered eligible inventions:

That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. . . . A process is a mode of treatment of certain materials to produce a given result. *It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing*. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. . . . The process requires that certain things *should be done with certain substances*, and in a certain order; but the tools to be used in doing this may be of secondary consequence.¹¹⁷

Co. v. Kalo Inoculant Co., 333 U.S. 127, 131 (1948).

113. See U.S. CONST. art. I, § 8, cl. 8 (“Inventors [for their] . . . Discoveries”); 35 U.S.C. § 100(a) (2006) (defining “invention” as “invention or discovery”).

114. See, e.g., *Parker v. Flook*, 437 U.S. 584, 590 (1978) (“[T]he Pythagorean theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques.”).

115. 17 F. Cas. 879, 881 (C.C.S.D.N.Y. 1862) (No. 9865) (emphasis added).

116. See Act of July 8, 1870, ch. 230, § 24, 16 Stat. 198, 201.

117. 94 U.S. 780, 787–88 (1876).

Thus, under *Cochrane*, inventive processes could be patent eligible by employing new discoveries without limitation to specific machines or, in the earlier terminology, to specified means.¹¹⁸

But even under *Cochrane*, an eligible “invention” not employing a particular apparatus still required a physical transformation and reduction of matter¹¹⁹ “to a different state or thing”¹²⁰—in other words, a change in the state or nature of the thing. As later argued to the Court in *Gottschalk v. Benson*,¹²¹

Though the *Morse* case and *The Telephone Cases* do not state the rule, in so many words, that patents on processes which do not involve the manipulation and transformation of physical materials from one physical or chemical state into another, must contain limitations confining the monopoly grant to the practice of the method by means of particular types of apparatus, we submit that the cases follow such a rule—implicitly or explicitly—and that they cannot be rationalized otherwise.¹²²

Although the Court in *Benson* (and later in *Parker v. Flook*¹²³ and *Bilski v. Kappos*¹²⁴) rejected the argument that the machine-or-transformation precedents established a limiting rule of patent eligibility, it acknowledged that the Court’s precedents on method patents had all conformed to that test.¹²⁵

The “machine-or-transformation” framework therefore is not *the standard* for eligibility, but merely *the consequence*, based on the facts of the cases presented, of the requirement that a patent-eligible invention must reflect invention in the application of otherwise ineligible science, nature, or ideas. Prior to *Cochrane*’s expansion to pure methods of the Court’s earlier limits on method claims,¹²⁶ eligible inventions necessarily had to be limited to specific physical embodiments that accomplished specific results, and thus had to be tied to “particular”¹²⁷ machines (or articles of manufacture) through which the applications of science, nature, or ideas were achieved.¹²⁸ After *Cochrane*, patentable process inventions could be articulated without limitation to such particular

118. See *Diamond v. Diehr*, 450 U.S. 175, 182–84 (1981).

119. *Id.*

120. *Cochrane*, 94 U.S. at 788.

121. 409 U.S. 63 (1972).

122. Reply Brief for the Petitioner at 9, *Gottschalk v. Benson*, 409 U.S. 63 (1972) (No. 71-485).

123. 437 U.S. 584, 588 n.9 (1978).

124. 130 S. Ct. 3218, 3226–27 (2010).

125. 409 U.S. at 71.

126. See *Corning v. Burden*, 56 U.S. (15 How.) 252, 268 (1853) (“[A] man cannot have a patent for the function or abstract effect of a machine, but only for the machine which produces it.”); *id.* at 269 (“He cannot describe a machine which will perform a certain function, and then claim the function itself, and all other machines that may be invented to perform the same function.”).

127. *Benson*, 409 U.S. at 70.

128. See Sarnoff, *supra* note 84, at 390–91.

physical implementing structures, but still required, for eligibility, creativity in the application; that is, they required transformation to a “different state or thing.”¹²⁹

Further, before the modern “information age,” inventive creativity required physical implementations for its useful application, and thus resulted in physical transformations.¹³⁰ *Cochrane* therefore required physical or chemical transformation just as *Hartranft* required a different thing to be created.¹³¹ At that time, all of the eligibility precedents could readily be fit into the machine-or-transformation framework. But mere physical implementation or transformation was not sufficient for eligibility, as uncreative applications of new discoveries, uncreative applications of existing inventions to new uses, or uncreative modifications of preexisting things also would reflect physical implementation or transformation, but would not result in new and eligible inventions. Thus, the Court in *Benson*, and again in *Bilski*, could treat the machine-or-transformation framework as “the clue” to patent eligibility for processes, even if it was not “intended to be an exhaustive or exclusive test” thereof.¹³²

By authorizing pure method patents in *Cochrane*,¹³³ moreover, the Court also expanded the scope of patents to cover unenumerated, and likely un contemplated, means of accomplishing specified results. This placed even greater emphasis on the newly strengthened requirement for distinct claims¹³⁴ and on the sufficiency of the written description of the invention to support claims of greater breadth that would then apply to any physical means of implementation that fell within the meaning of the claim language.¹³⁵ Following *Cochrane*, it became even more difficult to distinguish, based on claim scope, between an ineligible application of a categorically excluded, newly discovered scientific principle or phenomenon and an eligible inventive process employing that principle or phenomenon and not limited to particular physical means. This is both because the scope of patent-eligible inventions expanded—so as to potentially cover all practical applications of newly discovered phenomena—and because the kind and degree of creativity required for an eligible invention may have been reduced. Thus, the distinction of

129. *Cochrane v. Deener*, 94 U.S. 780, 788 (1876).

130. See *Bilski v. Kappos*, 130 S. Ct. 3218, 3227 (2010) (comparing the “Information Age” to the “Industrial Age”).

131. Compare *Cochrane*, 94 U.S. at 788, with *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887).

132. *Bilski*, 130 S. Ct. at 3226–27 (quoting *Benson*, 409 U.S. at 70).

133. 94 U.S. at 788.

134. See Act of July 8, 1870, ch. 230, § 26, 16 Stat. 198, 201.

135. See Joshua D. Sarnoff, *The Historic and Modern Doctrines of Equivalents and Claiming the Future: Part II (1870–1952)*, 87 J. PAT. & TRADEMARK OFF. SOC’Y 441, 451–54 (2005) (discussing effects of the distinct claiming requirement and its relationship to the expanded scope of permissible claims following *Cochrane*).

creative and eligible from mere and ineligible applications may have become somewhat more difficult to discern.

In 1888, in the famous Alexander Graham Bell telephone case (*Dolbear v. American Bell Telephone Co.*), the Supreme Court upheld a patent for a very broad process claim:

In the present case the claim is not for the use of a current of electricity in its natural state as it comes from the battery, but for putting a continuous current in a closed circuit into a certain specified condition suited to the transmission of vocal and other sounds, and using it in that condition for that purpose. . . . Bell was the first to discover this fact, and how to put such a current in such a condition, and what he claims is its use in that condition for that purpose, just as Morse claimed his current in his condition for his purpose. . . . It may be that electricity cannot be used at all for the transmission of speech except in the way Bell has discovered, and that therefore, practically, his patent gives him its exclusive use for that purpose, but that does not make his claim one for the use of electricity distinct from the particular process with which it is connected in his patent. It will, if true, show more clearly the great importance of his discovery, but it will not invalidate his patent.¹³⁶

As the Court later explained in *Benson*, Bell's claim "was not one for all telephonic use of electricity."¹³⁷ As the Court had suggested in *Dolbear*, using *Benson's* modern terminology, Bell's claim might permissibly "pre-empt" all uses (that is, the full scope of application) of the *invented process* and—if the invented process were the only means of accomplishing the desired result—all means of accomplishing the particular end *that the invented process achieves*.¹³⁸ But Bell's claim did not, and could not, preempt all uses of the previously known, or newly discovered, natural phenomenon—electronic transmission of signals—that Bell's creative, invented process employed. It could, however, preempt yet to be discovered means of accomplishing the *creative* end result of placing circuits in the appropriate condition for signal transmission.¹³⁹ This was because invention required *creativity* in the application of the natural phenomenon; Bell's invention was not the mere application of newly discovered but inherent properties of electricity to the novel context of speech transmission.¹⁴⁰

136. 126 U.S. 1, 534–35 (1888).

137. *Gottschalk v. Benson*, 409 U.S. 63, 69 (citing *Dolbear*, 126 U.S. at 535).

138. *See id.* at 72.

139. *See Dolbear*, 126 U.S. at 538–39 (noting that Bell's claim was for the use of electricity *in a particular condition* to transmit signals, that "long before he did so it was believed by scientists that it could be done by means of electricity" but Bell "discovered the way of doing it," although the patent was not confined to the "mere means he improvised to prove the reality of his conception" (emphasis added)).

140. *See id.*; *cf. id.* at 573 (Bradley, J., dissenting) ("[T]here are two modes (as yet discovered) by which these undulations [of electric current] may be thus produced.").

In contrast, and unlike in *Dolbear*, the Supreme Court in *Benson* failed to appreciate the requirement for additional creativity in the application, which distinguished claims to inventions from claims to ineligible natural phenomena. The Court thus rejected the implication in *Dolbear* that a patent could issue that preempted all means of accomplishing the *inventive* end to be achieved—at least when the end was the only practical application for a new natural or abstract discovery:

The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly preempt the mathematical formula and in practical effect would be a patent on the algorithm itself.¹⁴¹

Benson's formulation focuses on the scope of the effects of granting the patent rather than on the nature of the invention actually reflected by the claim; in other words, on preemption of applications or of sequential invention.¹⁴² But this formulation confuses the distinction between ineligible discoveries and patentable inventions, and thus between science, nature, and ideas on the one hand and human technology and practical applications on the other. The closed circuits at issue in *Dolbear* did not exist in nature; they were synthetic creations of humans and thus their principles of operation and the technology they reflected were, at least according to the Court, sufficiently creative *inventions* that could be patented without regard to their preemptive scope.¹⁴³

Six years after *Benson*, in *Parker v. Flook*, the Court reiterated its earlier understanding that a patentable invention required additional creativity in the application of newly discovered phenomena, rather than a merely narrow scope of exclusion, which does not chill too much sequential innovation: “Even though a phenomenon of nature or mathematical formula may be well known, an inventive application of the principle may be patented. Conversely, the discovery of such a phenomenon cannot support a patent *unless there is some other inventive concept in its application.*”¹⁴⁴

Three years later still, in *Diamond v. Diehr*, the Court reiterated that a mathematical formula cannot be patented¹⁴⁵ and that “this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment. . . . Similarly,

141. *Benson*, 409 U.S. at 71–72.

142. See Chisum, *supra* note 51, at 28–30 (discussing how *Benson* improperly focused on the scope of exclusion rather than on the nature of the disclosed invention).

143. See 126 U.S. at 538–39.

144. 437 U.S. 584, 594 (1978) (emphasis added); cf. Lemley et al., *supra* 12, at 1330 (“Overclaiming under § 101 . . . is primarily concerned with removing obstructions to follow-on innovation.”).

145. This implies that mathematical formulas (and similarly formulaic algorithms) are either “abstract ideas” or “natural phenomena.” See Samuelson & Schultz, *supra* 47, at 112–13 (discussing *Bilski*'s treatment of algorithms as abstract ideas).

insignificant postsolution activity will not transform an unpatentable principle into a patentable process.”¹⁴⁶ Although the Court in *Diehr* did not adequately explain why this was the case, it at least acknowledged that the mere limitation of the formula to a specific context or the addition of insignificant physical implementation steps would not by itself be sufficient to constitute creative, and thus inventive, applications of the formula.¹⁴⁷

Although the Court in *Diehr* reiterated *Flook*'s requirement to treat the newly discovered formula as if it were already in the prior art, the Court criticized the argument that the claim could not be eligible if every element except the formula was already known in the art:

[A] new combination of steps in a process may be patentable even though all the constituents of the combination were well known and in common use before the combination was made. The “novelty” of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter. . . .

. . . .

. . . The fallacy in this argument is that we did not hold in *Flook* that the mathematical algorithm could not be considered at all when making the § 101 determination. To accept the analysis proffered by the [Government] would, if carried to its extreme, make all inventions unpatentable because all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious.¹⁴⁸

Although the Court was undoubtedly technically correct that a combination of old elements may be patent eligible, its discussion of the need to focus on the claim as a whole, rather than on dissecting claim elements to determine the point of novelty, was misleading on two levels. First, even in *Flook*, the Court had rejected the idea that claim dissection was required, holding that its “approach to respondent’s application is, however, not at all inconsistent with the view that a patent claim must be considered as a whole” before determining whether the claim “considered as a whole” reflected any “other inventive concept in its application” of the categorically excluded algorithm.¹⁴⁹ Second, precluding the novelty of a newly discovered but ineligible algorithm from directly supplying the eligibility of a claim containing old elements does not necessarily lead to finding *all* implementations (applications) employing the algorithm obvious, any more than a novel combination of prior-art elements is inherently obvious without considering the creativity reflected by *the*

146. 450 U.S. 175, 191–92 (1980) (internal citation omitted) (citing *Flook*, 437 U.S. at 584).

147. *See id.*

148. *Id.* at 188–89, 189 n.12.

149. 437 U.S. at 594.

combination.¹⁵⁰ Rather, it is precisely those creative applications that are not implicit in light of underlying scientific principles that constitute an “invention” eligible for patenting.

Diehr, like *Benson*,¹⁵¹ thus imposed needless confusion by permitting the creativity of the ineligible discovery to contribute directly to the eligibility of a claimed application without considering whether there was any additional creativity in the application itself. This confusion is particularly evident given the Court’s simultaneous acceptance in *Diehr* of the premise that the algorithm itself could not be patented when merely limited to particular fields of application (technological contexts) or when combined with insignificant (physical) activity.¹⁵² Such claims when viewed “as a whole” constitute the same “type of subject matter,”¹⁵² processes, as do creative and inventive applications of new discoveries—they just lack invention in those applications. Similarly, the Court’s reference to the transformation prong of the machine-or-transformation framework to suggest when a claim “considered as a whole[] is performing a function which the patent laws were designed to protect”¹⁵³ provides no basis to distinguish when *sufficient* transformations have been created, as is required under *Cochrane*.¹⁵⁴ *Diehr* thus offered no means to assess whether particular processes applying scientific discoveries and abstract ideas were or were not inventions.

3. *Developing the Non-Analogous Uses and Markedly Different Characteristics Tests*

Returning to the nineteenth century, in 1892—four years after *Dolbear*—the Court in *Ansonia Brass & Copper Co. v. Electric Supply Co.* noted that “nothing is better settled in this court than that *the application of an old process to a new and analogous purpose* does not involve *invention*, even if the new result had not before been contemplated.”¹⁵⁵ Clearly, the Court could not have understood *Dolbear* to permit eligibility based simply on novelty or physical transformations. In contrast, a new use of an existing thing—including a natural product—or of an existing process could be an eligible invention *if* that new use was *not* analogous to a known use of the thing or process and thus was a sufficiently creative application:

150. Compare, e.g., *United States v. Adams*, 383 U.S. 39, 45–48, 50–51 (1966), with *Anderson’s-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 58–62 (1969).

151. See 450 U.S. at 191–92.

152. *Id.* at 188–89.

153. *Id.* at 192 (“[P]erforming a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing) . . .”).

154. See *Cochrane v. Deener*, 94 U.S. 780, 788 (1877).

155. 144 U.S. 11, 18 (1892) (emphasis added).

On the other hand, if an old device or process be put to a new use which is not analogous to the old one, and the adaptation of such process to the new use is of such a character as to require the exercise of inventive skill to produce it, such new use will not be denied the merit of patentability.¹⁵⁶

Although *Ansonia Brass* did not directly address applications of newly discovered natural things or scientific knowledge, this requirement for creativity of claimed applications was perhaps best described in that context by the Ninth Circuit in *Wall v. Leck*, decided three years later:

[E]mployment of [a scientific discovery] in the modes or through the instrumentalities by which it is applied in nature is a mere imitation of what every man is able to perceive and reproduce as well as [t]he [patentee]. All endeavors to confine it to himself are at once futile and unjust. . . . The laws . . . do not permit any man to exclusively use the conditions which are the gifts of nature, simply because he was the first one to discover its value. Not until some new instrument or method is contrived for its direction *towards ends which it cannot naturally accomplish* does his creative genius manifest itself.¹⁵⁷

The implication of *Wall* is crystal clear. To be an eligible invention, the claimed, novel application of a natural phenomenon or scientific principle must exhibit some *function* different than that which exists in nature. It is that different function which supplies the requisite creativity for the claimed, novel application of a thing or a process to be considered an eligible invention.¹⁵⁸

In the first half of the twentieth century, in *American Fruit Growers, Inc. v. Brogdex Co.*, the Court held—based on *Hartranft*—that to be patent eligible as a “manufacture,” a new and different article created from pre-existing nature (or other human-created inventions) had to “possess[] a new or distinctive form, quality, or property. . . . There [must be a] change in the name, appearance, or general character of the [thing from which it was created].”¹⁵⁹ Echoing *Cochrane*, the Court also noted that there must be a physical “transformation” involved in making “a new and different article . . . emerge.”¹⁶⁰ But as it was already known in the art that boracic acid prevented mold (on fruit), the “mere substitution of [alkaline borax for boracic acid, even if novel] would not involve invention.”¹⁶¹ Such a substitution would generate a novel but necessarily analogous, and thus ineligible, product, just as the novel but analogous use was ineligible in *Ansonia Brass*.¹⁶² This was true even

156. *Id.*

157. 66 F. 552, 558 (9th Cir. 1895) (emphasis added) (citing, inter alia, ROBINSON, *supra* 49, § 186).

158. *Cf.* Funk Bros. Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 131 (1948).

159. 283 U.S. 1, 11–12 (1931); *see also id.* at 12–13 (citing *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887)).

160. *Id.* at 13.

161. *Id.* at 14 (citing I ALBERT H. WALKER, WALKER ON PATENTS § 426 (6th ed. 1929)).

162. *Ansonia Brass & Copper Co. v. Elec. Supply Co.*, 144 U.S. 11, 18 (1892).

though the novel combination had properties (mold resistance) that were not possessed by the natural article (fresh fruit) alone, and even though the claimant had discovered a natural property regarding inhibition of blue mold spore growth, that is, that borax was “especially potent in its retarding and inhibiting action.”¹⁶³ The product remained analogous to natural fruit, with the new property merely “protect[ing] . . . against deterioration” without any “change in the name, appearance, or general character of the fruit.”¹⁶⁴ The product claim thus was ineligible because the natural thing (fruit) was not transformed into an invention; the process claims were invalid as not new in light of analogous prior-art treatment of fruit with boracic acid.¹⁶⁵

In the most recent Supreme Court case on patent-eligible things created from products of nature, *Diamond v. Chakrabarty*, the Court reiterated *Hartranft*'s requirement for “a product of human ingenuity ‘having a distinctive name, character [and] use.’”¹⁶⁶ The Court, moreover, distinguished as an eligible invention the claimed synthetic bacterium at issue from the claimed novel combination of naturally occurring bacteria that it had found to be ineligible in *Funk Brothers Seed Co. v. Kalo Inoculant Co.*¹⁶⁷ In *Funk Brothers*, the patentee had “used that discovery [of the noninhibiting effect of certain species of bacteria] to produce a mixed culture capable of inoculating the seeds of leguminous plants,” but the novel, human-produced culture was “only some of the handiwork of nature,” “[n]o species acquire[d] a different use,” and the combination “serve[d] the ends nature originally provided and act[ed] quite independently of any effort of the patentee.”¹⁶⁸ In contrast, the new bacterium created by Chakrabarty had “markedly different characteristics from any found in nature and . . . the potential for significant utility.”¹⁶⁹

The “markedly different characteristics” standard of *Chakrabarty* is essentially the same as the non-analogous use requirement articulated in *Ansonia Brass*. Unless the newly created thing is *markedly* different, it might be novel but not meaningfully different; that is, it may be similar and thus analogous. Unless markedly different, the novel product would not reflect a sufficiently creative change to an existing thing as to convert it into an invention. Further, the fact that the novel bacterium in *Chakrabarty* possessed utility could not have been the feature or requirement for eligibility that distinguished *Funk Brothers*. The *Funk*

163. *Am. Fruit Growers*, 283 U.S. at 8.

164. *Id.* at 11–12.

165. *See id.* at 13–14.

166. 447 U.S. 303, 309–10 (1980) (quoting *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887)) (alteration in original).

167. 333 U.S. 127 (1948).

168. *Chakrabarty*, 447 U.S. at 310 (emphasis added) (quoting *Funk Bros.*, 333 U.S. at 131).

169. *Id.*

Brothers combination, and other discoveries and inventions previously found ineligible by the Court (including the treated fruit in *American Fruit Growers*), possessed substantially improved practical utility.¹⁷⁰

Although the Court in *Funk Brothers* did not directly explain why the novel combination at issue did not reflect sufficient creativity to constitute a patent-eligible human invention, the Court's treatment of the *scientific discovery* of the noninhibiting effect of naturally occurring bacteria provides an answer. As the Court noted, not only were the qualities of the bacteria at issue not patentable because patents "cannot issue for the discovery of the phenomena of nature,"¹⁷¹ but also because those qualities "like the heat of the sun, electricity, or the qualities of metals, are *part of the storehouse of knowledge* of all men. They are manifestations of laws of nature, free to all men and reserved exclusively to none."¹⁷² As in *Morse*, the discovery of the qualities of the bacteria had to be treated as if it were *already* known, even though the applicant himself first made the discovery and thus added the knowledge to the storehouse for the public to gain access to it.¹⁷³ Once that discovery was treated as if in the prior art, no sufficient creativity was required to apply it to the particular useful result by merely combining the strains of bacteria that were then (fictionally) already known to be noninhibiting. Stated differently, the combination was neither a new thing with markedly different characteristics nor a non-analogous use of the pre-existing, and fictionally known, qualities of the bacteria, even if a non-naturally occurring, novel, and useful combination resulted. The Court thus specifically rejected the lower court's view that making a "new and different composition of noninhibitive strains which contributed utility and economy to the manufacture and distribution of commercial inoculants" was an "invention within the meaning of the patent statutes."¹⁷⁴ And it said this at a time when the statute did not contain a requirement for non-obvious invention, but only the eligibility standard and its statutory categories.¹⁷⁵

Funk Brothers was decided shortly before the non-obviousness requirement of patentability was first codified in the 1952 Act.¹⁷⁶ As the Supreme Court held in *Graham v. John Deere Co.*, Congress clearly saw the codification as a major change to the statute and as an opportunity both to provide a new linguistic formula for the required creativity for

170. See *Am. Fruit Growers*, 283 U.S. at 8 (discussing the significantly improved mold resistance resulting from treatment with ordinary borax).

171. *Funk Bros.*, 333 U.S. at 130.

172. *Id.* (emphasis added).

173. See *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 116 (1853).

174. *Funk Bros.*, 333 U.S. at 130-31.

175. See 35 U.S.C. § 31 (1948).

176. See Act of July 19, 1952, Pub. L. No. 82-593, § 103, 66 Stat. 792, 798 (adopting section 103) (codified as amended at 35 U.S.C. § 103(a) (2006)).

patentability—non-obviousness rather than invention—and to avoid concerns raised by the language or certain precedents,¹⁷⁷ while preserving the same general level of creativity that had preceded enactment:

The major distinction is that Congress has emphasized “nonobviousness” as the operative test of the section, rather than the less definite “invention” language of *Hotchkiss* that Congress thought had led to “a large variety” of expressions in decisions and writings. In the title itself the Congress used the phrase “Conditions for patentability; *non-obvious subject matter*” . . . thus focusing upon “nonobviousness” rather than “invention.”

. . . .

It is undisputed that this section was, for the first time, a statutory expression of an additional requirement for patentability, originally expressed in *Hotchkiss*. It also seems apparent that Congress intended by the last sentence of § 103 to abolish the test it believed this Court announced in the controversial phrase “flash of creative genius,” used in *Cuno Engineering Corp. v. Automatic Devices Corp.*

. . . .

We believe that this legislative history, as well as other sources, shows that the revision was not intended by Congress to change the general level of patentable invention.¹⁷⁸

Nevertheless, the legislative history provides *no* suggestion that Congress intended to change the then-existing law regarding patent *eligibility* in any way except one.¹⁷⁹

In 1943, in *In re Thuau*, the Federal Circuit’s predecessor court had departed from the Supreme Court’s *Ansonia Brass* precedent and had held that *all* new uses of known things, even non-analogous uses—and thus also *all* new uses of phenomena of nature, which had to be treated as if already known—were unpatentable as not a new “art,” under the eligibility language of the 1870 Act.¹⁸⁰ Congress thus substituted the term “process” for “art” in the new eligibility section 101,¹⁸¹ which it otherwise left unchanged from the 1870 Act, and defined “process” in section

177. See generally Rich, *supra* note 25.

178. *Graham v. John Deere Co.*, 383 U.S. 1, 14–15, 17 (1966) (emphasis added) (citing *Cuno Eng’g Corp. v. Automatic Devices Corp.*, 314 U.S. 84 (1941)).

179. See H.R. REP. NO. 82-1923, at 6 (1952) (“[The language of the 1870 Act] has been preserved except that the word ‘art’ which appears in the present statute has been changed to the word ‘process.’ . . . The definition of ‘process’ has been added in section 100 to make it clear that ‘process or method’ is meant, and also to clarify the present law as to the patentability of certain types of processes or methods as to which some insubstantial doubts have been expressed.”); *id.* at 17 (“The remainder of the definition clarifies the status of processes or methods which involve merely the new use of a known process, machine, manufacture, composition of matter, or material; they are processes or methods under the statute and may be patented provided the conditions for patentability are satisfied.”); S. REP. NO. 82-1979, at 4–5, 13 (1952); see also Pasquale J. Federico, *Commentary on the New Patent Act* (1954), reprinted in 75 J. PAT & TRADEMARK OFF. SOC’Y 161, 176–78 (1993).

180. 135 F.2d 344, 347 (C.C.P.A. 1943).

181. See Act of July 19, 1952, Pub. L. No. 82-593, § 101, 66 Stat. 792, 797 (codified as amended at 35 U.S.C. § 101 (2006)).

100(b)¹⁸² to overturn *Thuau* and to restore the law of eligibility to its prior state.¹⁸³ In doing so, Congress also clarified in the legislative history that the term “process” included pure methods, based on the Court’s prior determinations that pure method patents were eligible.¹⁸⁴

Specifically, new section 100(b) provided that the statutory term “process” means “process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.”¹⁸⁵ Although this statutory language is broad, there is no suggestion that the phrase “includes a new use” was intended to mean “includes every new use,” eliminating the requirement for an “invention” to reflect at least some creativity in any novel application. Section 101 continued to apply to persons who “invent or discover” one of the statutory categories, and the change to the definition of “process” would then have reflected a much more dramatic and fundamental change to the meaning of these terms.¹⁸⁶ In contrast, the legislative history indicates that “invention” was defined to include “invention or discovery” only in order to avoid repetition in the statute,¹⁸⁷ and there is no suggestion whatsoever that Congress intended such a radical departure from its eligibility precedents.¹⁸⁸

Contemporaneous commentary also suggests that the statutory language in section 100(b) was intended solely to restore the law to what the Court had established in *Ansonia Brass*. As noted by Stefan Riesenfeld,

[T]he background of the amendment gives reason to assume that a newly discovered use for a known substance, machine or process is still only patentable if it is not merely analogous or cognate to the uses heretofore made. . . . [I]t is fair to state that in essence the new statutory definition of “process” restores the broad principles of patentability flowing from a careful analysis of the exposition given by the Supreme Court in the *Ansonia* case¹⁸⁹

Similarly, as noted by Pasquale Federico, one of the 1952 Act’s two principal drafters,

The reference to the new use of a known machine or manufacture in the definition merely means that processes may utilize old machines or manufactures and the reference to the new use of a known process simply indicates that the procedural steps in a patentable process might be old.¹⁹⁰

182. See *id.* § 100(b), 66 Stat. at 797 (codified as amended at 35 U.S.C. § 100(b) (2006)).

183. See, e.g., Stefan A. Riesenfeld, *The New United States Patent Act in the Light of Comparative Law I*, 102 U. PA. L. REV. 291, 299–300 (1954).

184. See H.R. REP. NO. 82-1923, at 6 (1952).

185. 35 U.S.C. § 100(b) (2006).

186. Cf. *supra* note 25 and accompanying text.

187. See H.R. REP. NO. 82-1923, at 16 (1952).

188. See Riesenfeld, *supra* note 183, at 299–300.

189. See *id.*

190. Federico, *supra* note 179, at 178.

Had Congress intended to authorize as an eligible “invention or discovery”¹⁹¹ even noncreative new uses of existing things, including newly discovered natural phenomena, it almost certainly would have said so in the legislative history. This is particularly true given the dramatic change to the law that such an alteration would have reflected, and given that the legislative history indicated that the only “major changes or innovations” to the statute consisted of “incorporating a requirement for invention in § 103”—following *Hotchkiss* and its numerous progeny—and revising “the judicial doctrine of contributory infringement in § 271.”¹⁹² Nor would changing only the definition of eligible *processes* to include new uses have altered the existing judicial standards for eligibility of the other categories of subject matter (things), which were required, per *Hartranft* and *American Fruit Growers*, to have “a distinctive name, character [and] use.”¹⁹³

It is, of course, conceivable to impute to the 1952 Congress the intent to make such dramatic changes to patent eligibility, if one ignores the legislative intent, adopts a purely textualist¹⁹⁴ reading of the statutory categories of section 101, and leaves all questions of sufficient creativity to the newly created non-obviousness provision of section 103.¹⁹⁵ But no Supreme Court decision since the 1952 Act has so construed the statute in regard to applications of categorically excluded science, nature, and ideas, and this interpretation is highly implausible for the reasons just stated. In particular, the Court has continued in *Benson*, *Flook*, *Chakrabarty*, *Diehr*, and *Bilski* to parse the creativity of novel applications of science, nature, and ideas to determine if they are eligible subject matter, notwithstanding their status as processes, machines, manufactures, or compositions of matter, rather than deferring all such questions to the obviousness inquiry under section 103.¹⁹⁶

Although this approach best corresponds to legislative intent, it is also efficient and normatively justified given the prior-art treatment of categorically excluded science, nature, and ideas, as discussed below. Further, it mirrors international understandings of the patent system.

191. See Act of July 19, 1952, Pub. L. No. 82-593, § 100(a), 66 Stat. 792, 797 (codified as amended at 35 U.S.C. § 100(a) (2006)).

192. H.R. REP. NO. 82-1923, at 5 (1952); see Karl B. Lutz, *The New 1952 Patent Statute*, 35 J. PAT. OFF. SOC'Y 155, 162 (1953).

193. *Am. Fruit Growers, Inc. v. Brogdex Co.*, 283 U.S. 1, 13 (1931); *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887).

194. See, e.g., William N. Eskridge, Jr., *The New Textualism*, 37 UCLA L. REV. 621, 640–56 (1990); John F. Manning, *Textualism and Legislative Intent*, 91 VA. L. REV. 419, 420–21 (2005).

195. Cf. Rich, *supra* note 25, at 29 (“[F]or the century following *Hotchkiss v. Greenwood* we had what was called the ‘requirement for invention,’ which, I emphasize, we have *not* had for the past twenty years. Instead we have § 103.”).

196. *But cf.* *Dann v. Johnston*, 425 U.S. 219, 220 (1976) (avoiding eligibility arguments, but reiterating the need to evaluate the differences between the prior art and the claim).

The World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property does not define invention or distinguish inventions from scientific, natural, and abstract discoveries, but requires that patents "shall be available for any inventions . . . in all fields of technology, provided they are new, involve an inventive step, and are capable of industrial application."¹⁹⁷ This reflects that whatever creativity is required for an eligible invention is not *necessarily* sufficient for an inventive step, but that there cannot be an inventive step without an eligible invention. Similarly, the European approach, under the European Patent Convention ("EPC"), which explicitly excludes things like ideas from being considered "inventions,"¹⁹⁸ requires for patentability that an eligible "invention" reflect an "inventive step."¹⁹⁹ As discussed below, however, the EPC applies the contributions of categorically ineligible subject matter inconsistently for eligibility and for patentability evaluations, allowing the creativity of newly discovered, categorically excluded subject matter to contribute to eligibility but not to an inventive step.²⁰⁰ Under the prior-art approach, the creativity of the categorically excluded subject matter does not contribute to eligibility or to patentability.

C. THE RELIGIOUS ORIGINS OF THE PROHIBITION ON PATENTING
DISCOVERIES AND THE MORAL OBLIGATION TO TREAT NEW DISCOVERIES
AS PRIOR ART

So where does this requirement to treat science, nature, and ideas as prior art come from? The following discussion supplies a partial historical account, starting with the post-Enlightenment, English Protestant religious understandings brought to the United States.²⁰¹ The discussion is of American cultural and legal thought, although other countries may have similar histories and doctrines.²⁰²

197. Agreement on Trade-Related Aspects of Intellectual Property Rights, art. 27(1), Dec. 15, 1993, 33 I.L.M. 81.

198. Convention on the Grant of European Patents, art. 52(2), Oct. 5, 1973, 13 I.L.M. 271, as revised Nov. 26, 2000.

199. *Id.* at arts. 52(1) & 56.

200. *See supra* note 199 and accompanying text.

201. *See generally* SARNOFF, *supra* note 48.

202. *Cf., e.g.,* Tokkyoh [Japanese Patent Act], Law No. 121 of 1959, Art. 2(1) ("['Invention' is] the *highly advanced creation of technical ideas utilizing the laws of nature.*" (emphasis added)); *Revision of the European Patent Convention (EPC 2000) Synoptic Presentation EPC 1973/2000—Part I: The Articles*, 2007 O.J. EPO SPEC. ED. 4, at 48 ("[The 2000 revisions to the European Patent Convention, Art. 52(1)] plainly expresses that patent protection is reserved for creations in the *technical field* . . . [that] must therefore have a 'technical character' or, to be more precise, involve a 'technical teaching.'"); Dr. Kelvin W. Willoughby, *How Much Does Technology Really Matter in Patent Law? A Comparative Analysis of Doctrines of Appropriate Patentable Subject Matter in American and European Patent Law*, 64 FED. CIR. B.J. 63, 75–124 (2008).

John Locke began his analysis of property from the basic moral equality of humans as God's creatures of equal station, having "an equal Right to the use of the inferior Creatures, for the comfortable preservation of their Beings."²⁰³ From this equal state of control over a natural God-given commons, Locke derived a moral principle of equal human regard from the typicality of the "God-given moral status" of each individual.²⁰⁴ This equal regard forces each individual to take every other individual's duty of self-preservation as having universality, anticipating the Kantian categorical imperative.²⁰⁵

Locke famously developed the concept of human labor granting the right to exclusive private appropriation of (private property in) nature, which otherwise was given by God to all humanity as commons property for all to share: "[T]hough the things of Nature are given in common, yet Man (by being Master of himself, and *Proprietor of his own Person*, and the *actions or Labour* of it) had still in himself the great *Foundation of Property . . .*"²⁰⁶ The reason that nature was understood as commons property is that nature as such was not a human but a divine creation and not subject initially to human control (dominion).²⁰⁷ Locke based his natural law conception of property on a Biblical moral imperative for productivity, which cultivation of land achieved: "Have a lot of children! Fill the earth with people and bring it under . . . control."²⁰⁸ And as with one's body, nature was God-given, which imposed inherent stewardship obligations on the uses humans could make of nature.²⁰⁹

As Justin Hughes has noted, Locke's labor theory debatably may depend on an assumption of "abundance" in nature, so that everyone who labors can obtain "*enough and as good*" from the commons as anyone else can obtain.²¹⁰ This condition has been called Locke's proviso,

203. JOHN LOCKE, *TWO TREATISES OF GOVERNMENT* § 87, at 243 (Peter Laslett ed., New American Library 1965) (1689).

204. JEREMY WALDRON, *GOD, LOCKE, AND EQUALITY: CHRISTIAN FOUNDATIONS OF JOHN LOCKE'S POLITICAL THOUGHT* 155–57 (2002) (quoting I JOHN LOCKE, *AN ESSAY CONCERNING HUMAN UNDERSTANDING* 94 (Alexander Campbell Fraser ed., Oxford, Clarendon Press 1894) (1690)) (citing I RICHARD HOOKER, *OF THE LAWS OF ECCLESIASTICAL POLITY* § 8, at 80 (Arthur Stephen ed., Cambridge Univ. Press 1989) (1593)).

205. IMMANUEL KANT, *ETHICAL PHILOSOPHY: THE COMPLETE TEXTS OF GROUNDING FOR THE METAPHYSICS OF MORALS, AND METAPHYSICAL PRINCIPLES OF VIRTUE, PART II OF THE METAPHYSICS OF MORALS* ¶ 421, at 30 (James W. Ellington trans., Hackett Publ. Co. 2d ed. 1994) (1785).

206. LOCKE, *supra* note 203, § 44, at 340–41.

207. *See id.* § 26, at 328.

208. *Genesis* 1:28.

209. *See* Sibyl Schwarzenbach, *Locke's Two Conceptions of Property*, 14 *SOC. THEORY & PRAC.* 141, 145–47 (1988); *see also* Roberta R. Kwall, Book Review, *The Author as Steward "For Limited Times,"* 88 *B.U. L. REV.* 685, 691–92, 700–08 (2008) (reviewing LIOR ZEMER, *THE IDEA OF AUTHORSHIP IN COPYRIGHT* (2007)).

210. Justin Hughes, *The Philosophy of Intellectual Property*, 77 *GEO. L.J.* 287, 297 (1988) (citing, *inter alia*, LOCKE, *supra* note 203, § 27; Thomas Mautner, *Locke on Original Appropriation*, 19 *AM. PHIL. Q.* 259, 260 (1982)).

or his sufficiency proviso.²¹¹ Further, after identifying the basis for private property in labor where sufficiency (equivalency) can be maintained, Locke immediately found limits on creating such property by appropriating nature, articulating what has been called his “spoliation” or waste proviso:²¹²

The same Law of Nature, that does by this means give us Property, does also *bound* that *Property* too. . . . As much as anyone can make use of to any advantage of life before it spoils; so much may he by his labour fix a Property in. Whatever is beyond this, is more than his share, and belongs to others.²¹³

For property in both acquired natural materials and enclosed land, to exceed the boundaries of what could be productively used was “to transform properly human liberty into license and thereby violate the highest potential of the species.”²¹⁴

Unlike physical property, intangible ideas are not part of a commons in the sense of an area capable of being depleted, but rather are part of a metaphorical area. That area is both nonrivalrous and expands, rather than is depleted, with use, and thus arguably always meets Locke’s sufficiency proviso.²¹⁵ For Locke, a person who “leaves as much as another can make use of, does as good as take nothing at all,”²¹⁶ and “unilateral acquisition . . . in circumstances of plenty . . . pays tribute to the underlying principle of equality by indicating that if the interests of others are *not* prejudiced by my acquisition then there can be no objection to it.”²¹⁷ But for the sufficiency proviso to be met with regard to property in ideas, the ideas subjected to appropriation must be fungible²¹⁸ and the property rights must not preclude similar ideas from being used by others.

In general, the broader the idea is, the less likely it will be that any similar idea will exist for others to use, either as an idea that already lies within the intellectual commons or as a potential idea that might be added to the commons by an initial inventor, and appropriator, of it.²¹⁹ For nonfungible ideas that are understood to preexist their discovery by

211. See, e.g., ROBERT NOZICK, *ANARCHY, STATE, AND UTOPIA* 175 (1974); WALDRON, *supra* note 204, at 172.

212. See, e.g., WALDRON, *supra* note 204, at 170; Hughes, *supra* note 210, at 325 (using the term “non-waste condition”).

213. LOCKE, *supra* note 203, § 31, at 332.

214. KRISTIE M. McCLURE, *JUDGING RIGHTS: LOCKEAN POLITICS AND THE LIMITS OF CONSENT* 94 (1996).

215. See Hughes, *supra* note 210, at 315.

216. LOCKE, *supra* note 203, § 33, at 333.

217. WALDRON, *supra* note 204, at 172 (citing LOCKE, *supra* note 203, §§ 33–34, at 333).

218. See Hughes, *supra* note 210, at 336 (citing Margaret J. Radin, *Property and Personhood*, 34 *STAN. L. REV.* 957, 989–91 (1982)) (discussing fungibility in regard to Hegelian personality theory of intellectual property).

219. *Cf. id.* at 323–25, 327.

humans, the commons is necessarily diminished and others are necessarily prejudiced by its exclusive acquisition and withdrawal from use by granting exclusive rights. For preexisting science and nature and for newly discovered and highly abstract ideas, “it is hard to imagine anything ‘as good’ that could be left for others to discover. . . . [Some] ideas are so fundamental . . . that allowing ownership in them would violate the equality of creative liberty which the proviso also embodies.”²²⁰ As recognized in *Funk Brothers*, these ideas are the “storehouse of knowledge of all men . . . free to all men and reserved exclusively to none.”²²¹ Or, in common patent parlance, some ideas simply cannot be designed around, given the world we live in and the need to make use of them or given their broad and basic nature. Thus, Locke’s provisos implied at natural law a prohibition on the patenting of science, nature, and abstract ideas—at least those that are believed to preexist their discovery by humans or are otherwise nonfungible.

Assuming that certain categories of ideas were sufficiently similar to be considered fungible, creating private property in them once they were “appropriated” would not violate the sufficiency proviso. But the *legal* inability of others to use or to build off of such ideas might still violate Locke’s waste proviso. For Locke, the waste that may result from creating property in ideas would not have been a loss so much of value to the creator or to others²²² as of productivity that might be made by preventing others from using the ideas.

To avoid waste in produced physical goods, Locke depended on trade in the money economy and the willingness of the property owner to sell the unused surplus goods to others without involving “tremendous reallocations of wealth toward the property holders of these ideas.”²²³ Otherwise, possession of such property would “[deny] *everyone* . . . the use of them by someone who has no use for them himself, or does not propose to put them to human use.”²²⁴

But providing private ownership of fungible ideas fails to account adequately for the waste that results from their nonrivalrous and nondepletable character. Market exchanges for *all* possible occurrences or uses of science, nature, and broad, abstract ideas would seem impossible, given their ability to be brought into existence and use virtually anywhere.

Because sharing knowledge of God’s natural laws—science, nature, and ideas—could not reduce the discoverer’s ability to employ them in

220. Wendy J. Gordon, *A Property Right in Self-Expression: Equality and Individualism in the Natural Law of Intellectual Property*, 102 YALE L.J. 1533, 1581 (1993).

221. *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948).

222. *See Hughes*, *supra* note 210, at 327–28.

223. *See id.* at 320.

224. WALDRON, *supra* note 204, at 171.

nature, the discoverer therefore had a *moral, God-given duty* to share knowledge of nature²²⁵ that could increase cultivation *by others*, and not merely to trade any surplus he or she might generate. This moral duty to share information with others also followed from Locke's effort:

[With Richard Hooker's help to make a case] for the Golden Rule: "Love thy neighbor as thyself" or "Do unto others as you would have them do unto you." . . . Richard Hooker's argument cited by Locke in section 5 of the *Second Treatise* is supposed . . . [t]o show that once we acknowledge that no human has a superior status, we have no choice but to treat the needs and desires of others as on a par with our own.²²⁶

Given equal concern for others, humans would similarly want other discoverers to freely and widely share their information regarding nature, so as to better assure self-preservation in accordance with God's purposes. The Golden Rule thus dictated creating the public domain of science, nature, and ideas.

By the late eighteenth century, notwithstanding changing theological conceptions and the growth of atheism, nature was understood as "one grand, interrelated design, comprehensible by rational investigation,"²²⁷ the understanding of which would benefit all humans. During this period, invention was still understood in the classical sense of uncovering something in nature that had been present all along, through the mechanism of divine providence in permitting human access to such knowledge.²²⁸ The divine creations of science, nature, and broad abstract ideas that were revealed to humanity through the efforts of scientists and philosophers, "those favoured mortals . . . who share that ray of divinity which we call genius," were thus intended to be freely available.²²⁹ And "[i]f the inventor was no more than God's instrument in bringing His gifts to the community, then he could at most claim user's rights over them."²³⁰

Moreover, the divine origins of discoveries of nature, and their initial status as commons property, imposed moral duties to freely share knowledge of science, nature, and ideas. Scientists were "entrusted by Providence with the delegated power of imparting to their fellow creatures that instruction which heaven meant for universal benefit; they must not be niggards to the world, or hoard up for themselves the

225. Cf. ROBINSON, *supra* note 49, § 25, at 39.

226. WALDRON, *supra* note 204, at 155 (citing 1 HOOKER, *supra* note 204, § 8, at 80).

227. CHRISTINE MACLEOD, *INVENTING THE INDUSTRIAL REVOLUTION: THE ENGLISH PATENT SYSTEM 1660–1800*, at 203 (Cambridge Univ. Press 2002) (1988) (citing ROBERT BOYLE, *THE WORKS OF THE HONOURABLE ROBERT BOYLE* (Thomas Birch, ed. 1744)).

228. See, e.g., *id.* at 198.

229. 17 THE PARLIAMENTARY HISTORY OF ENGLAND col. 999 (T.C. Hansard 1813) (1774) (Lord Camden).

230. MACLEOD, *supra* note 227, at 198.

common stock.”²³¹ As Edward Walterscheid noted, the medieval belief that “genius was a gift of God . . . largely precluded an earlier development of the concept of intellectual property. For how could one properly seek to obtain commercial value from that which was perceived to have been granted by the grace of God?”²³² Although times were changing, they had not done so for patents on science, nature, and ideas—and still have not done so.

The religion-inspired prohibition on owning science, nature, and abstract ideas was well understood by the end of the eighteenth century, as reflected in the fact that all of the judges in *Boulton v. Bull* acknowledged that “mere principles” were not capable of being patented.²³³ Thus, Joseph Bramah argued against Watt’s patent by stating that the “works of men begin” at the point “where the independent works of God end, who by his own secret *principles* and *methods* . . . established the elements and their properties, and stocked the universal storehouse” of endless changes producible by different combinations and proportions.²³⁴

Further, it was commonly recognized at that time that property rights in functional ideas (inventions), unlike in literary authorial ideas (published words),²³⁵ did not arise under natural law.²³⁶ Such invention rights could exist only by the positive act of a government—through the grant of patents—and were not otherwise recognized at common law.²³⁷ Utilitarian philosophers in the late eighteenth century therefore felt the need to articulate a call for government intervention to create rights to inventions as incentives for their production and distribution.²³⁸ But these positive law rights did not and, given contemporaneous deontological moral beliefs, could not attach to the science, nature, and ideas themselves, only to the creative human applications that the inventor had actually discovered. And, as aptly put by the late nineteenth century patent law scholar William Robinson, the religious prohibition on

231. 17 THE PARLIAMENTARY HISTORY OF ENGLAND, *supra* note 229, at col. 999; see I WILLIAM BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND, 1765–6, at 8, 14, 39–40 (Univ. of Chicago 1979) (1766) (discussing moral duties to disseminate knowledge).

232. WALTERSCHEID, *supra* note 47, at 39.

233. See (1795) 126 Eng. Rep. 651, 667 (Lord Eyre, C.J.).

234. MACLEOD, *supra* note 227, at 220 (quoting JOSEPH BRAMAH, A LETTER TO THE RT. HON. SIR JAMES EYRE, LORD CHIEF JUSTICE OF THE COMMON PLEAS (1797)).

235. In 1774, in *Donaldson v. Beckett*, (1774) 98 Eng. Rep. 257 (H.L.), the English Parliament reversed its earlier decision in *Millar v. Taylor*, (1769) 98 Eng. Rep. 201 (K.B.), that copyrights arose at natural law. See generally LYMAN RAY PATTERSON, COPYRIGHT IN HISTORICAL PERSPECTIVE (1968).

236. See, e.g., WALTERSCHEID, *supra* note 47, at 203–04 (citing THE FEDERALIST No. 43 (James Madison)); cf. *Millar v. Taylor*, (1769) 98 Eng. Rep. at 218 (Willes, J.); *id.* at 222 (Aston, J.); *id.* at 230–35 (Yates, J.).

237. See *Millar*, 98 Eng. Rep. at 230–31 (Yates J.).

238. See HAROLD G. FOX, MONOPOLIES AND PATENTS: A STUDY OF THE HISTORY AND FUTURE OF THE PATENT MONOPOLY 204 (1947).

creating such property and the obligation to share new discoveries corresponded with the utilitarian goal of promoting progress, whether understood as creative development or as dissemination: “To benefit by the discoveries of his fellow-men is thus not only a natural right, it is also the natural duty which every man owes to himself and to society; and the mutual, universal progress thence resulting is the fulfillment of the earthly destiny of the human race.”²³⁹ As described above, these commitments have been preserved throughout the more than two hundred years of American patent law doctrine; we continue to recognize the exclusions for science, nature, and ideas as a matter of *stare decisis*.²⁴⁰

In summary, the prior-art treatment of newly discovered science, nature, and ideas reflects long-standing and deeply held deontological *and* utilitarian moral commitments to protecting the public domain and to assuring its free availability and dissemination for the development and use by the public of their many applications. The “invention in the application” test and the “markedly different” and “non-analogous use” standards for assessing eligibility protect the public domain by permitting only different and sufficiently creative inventive concepts to be eligible, thus preventing the piecemeal claiming of uncreative applications within the public’s grasp, which would, in effect, claim the discoveries themselves. Although the courts may not have specified (or consistently imposed) the criteria for determining the degree and kind of creativity that reflect markedly different characteristics or non-analogous uses, they have yet to abandon this framework, even when unconsciously applying or affirmatively resisting it.²⁴¹

II. EXPLAINING THE RELATIONSHIP OF THE EXCLUSIONS FOR SCIENCE, NATURE, AND IDEAS TO PATENT ELIGIBILITY AND PATENTABLE INVENTION

History reveals that the three categorical exclusions from patent-eligible subject matter—for “laws of nature, physical phenomena, and abstract ideas”²⁴²—and the need for more than “field of use” limits or “token postsolution components,”²⁴³ define the boundaries of potentially eligible “inventions” subject to the patentability requirements of the rest of the statute. Additional policy guidance is needed to relate those other

239. ROBINSON, *supra* note 49, § 25, at 39. See generally Malla Pollack, *What Is Congress Supposed to Promote?: Defining “Progress” in Article I, Section 8, Clause 8 of the United States Constitution, or Introducing the Progress Clause*, 80 NEB. L. REV. 754 (2001).

240. See *Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010).

241. See, e.g., *Diamond v. Diehr*, 450 U.S. 175, 191–92 (1981); *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 868–69 (Fed. Cir. 2010).

242. *Bilski*, 130 S. Ct. at 3225 (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)).

243. *Id.* at 3231.

requirements to the invention requirement, and to inform the judgments of similarity and difference required for establishing eligibility, as markedly different characteristics or non-analogous uses (or new inventive principles) of any newly discovered science, nature, and ideas.²⁴⁴ This guidance cannot be supplied by the competing approaches to eligibility that have been articulated by the courts and partially supported by some scholars.

A. MISTAKEN MODERN APPROACHES TO ELIGIBILITY

Concern over “preempting” applications by patenting claims to applications of science, nature, and ideas²⁴⁵ is both misleading and unhelpful. Preemption is a misleading concept because the scope of a claimed invention simply is *not* the relevant question for eligibility. As *Dolbear* held, but *Benson* has called into question, so long as the claimed application of a natural phenomenon is sufficiently creative, it may preempt all physical means of creating or performing it.²⁴⁶ This is true even if the claimed manner of application is the only way to achieve the desired result and thereby covers all practical uses of a new scientific discovery. Of course, it would be correspondingly unlikely that—once a new scientific discovery became known and was treated as prior art—the *only* practical use would be a sufficiently *creative* application.

Preemption is unhelpful because it changes the focus from the nature of the invention for which patent protection is sought, and from the requisite judgments of human creativity or similarity, onto the consequence of granting protection; that is, it puts the cart of the conclusion before the horse of one of its premises.²⁴⁷ Moreover, once pure method patents are acknowledged as patent eligible, claim scope determinations cannot supply the required distinctions between ineligible natural discoveries and noncreative applications of them on the one hand, and broad but inventive applications of them on the other.²⁴⁸

Similarly, using the machine-or-transformation framework to assess whether a claimed process invention employs a “particular machine” or achieves a physical transformation of “a particular article into a different state or thing”²⁴⁹ is misleading and unhelpful. The machine-or-transformation framework misdirects attention to insufficient conditions

244. See *supra* Part I.A–I.B.

245. See *supra* notes 31, 45, 141–43 and accompanying text.

246. See *supra* notes 125, 136–41 and accompanying text.

247. Cf. Chisum, *supra* note 51, at 29 (arguing that in *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972), the Supreme Court extended the categorical exclusions from the “Invention Achievement Inquiry” “through the ‘preemption’ concept to the Protection Scope Inquiry, as to which the intuitive appeal is not so strong”).

248. See *supra* notes 116–32 and accompanying text.

249. *Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010).

for eligibility.²⁵⁰ It fails to supply distinguishing criteria for the types and uses of machines that can be creatively employed and thus distinguished from mere (but physical) applications, or analogous uses, of newly discovered science, nature, and ideas. The transformation framework similarly fails to distinguish the kinds and degrees of physical transformation that are sufficiently creative, as the different things may not reflect markedly different characteristics or the different methods may reflect only analogous uses. The machine-or-transformation framework (but not the Supreme Court's resistance to making it an exclusive test²⁵¹) also fails to recognize that specific machines or physical transformations were required for Industrial Age creative applications. The framework is the consequence of the legal standard applied to the facts of that era rather than the imposition of a necessary condition. Accordingly, the Supreme Court has repeatedly held, without adequately explaining why, that the framework is overly prescriptive and that claims not meeting the framework may nevertheless be eligible.²⁵² In contrast, although it has not explicitly stated that the framework is overly inclusive, in that claims meeting the framework may nevertheless be ineligible,²⁵³ the Court has in recent cases found method claims that achieve useful transformations, including those that are physical, to be ineligible.²⁵⁴

The machine-or-transformation framework thus is not helpful in preventing improper allowance of narrow but insufficiently creative claimed applications of science, nature, and ideas, although it may help to preclude the eligibility of overly broad and abstract claims.²⁵⁵ It may also be insufficiently stringent if additional constitutional constraints exist, based on defining the "useful Arts" (in contrast to liberal or martial arts) in a manner that is not coextensive with the historic requirements for "invention."²⁵⁶

250. See *supra* notes 40–41, 126–32 and accompanying text.

251. See *Bilski*, 130 S. Ct. at 3226.

252. See *id.* at 3226–27 (citing *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978)).

253. See *supra* notes 159–69 and accompanying text; *cf. In re Bilski*, 545 F.3d 943, 959–60 (Fed. Cir. 2008) (en banc) (discussing and disavowing the "useful, concrete, and tangible result" test of *In re Alappat*, 33 F.3d 1526, 1544 (Fed. Cir. 1994) (en banc), and of *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998)).

254. See *Bilski*, 130 S. Ct. at 3231; *Flook*, 437 U.S. at 586 (noting the claim at issue for catalytic conversion of hydrocarbons was useful in "a broad range of potential uses" in the petrochemical and oil refining industries).

255. See, e.g., *In re Bilski*, 545 F.3d at 963–65 (finding that a change in legal rights did not involve the required machine implementation or an eligible transformation, although physical activity was required to implement the claims).

256. See CASRIP *Bilski* Brief, *supra* note 67, at 18–19, 25 n.44 (suggesting that tests are needed based on both protecting the public domain of science, nature, and ideas *and* on limiting patents to useful arts).

Concern over reading the claim as a whole²⁵⁷ is also misleading and unhelpful. The “claim as a whole” concern poses a straw man, because dissection into claim elements was never a requirement for evaluating eligibility.²⁵⁸ Rather, assessment of the inventive contribution in applying the scientific discovery, or the “other inventive concept,”²⁵⁹ has always been required for eligibility, just as the Supreme Court in *Graham v. John Deere Co.* recognized the need to first determine the difference between the claimed invention and the prior art before assessing whether a claimed invention is obvious.²⁶⁰ Moreover, although reading the claim as a whole is a predicate for evaluating the inventive contribution and for determining into which of the statutory categories a claimed invention falls, it does not reach the question of whether the inventive contribution is sufficient for eligibility or whether the claimed “invention” is excluded. This is true even when the claim as a whole falls within the language of one of the statutory categories, whereas the categorically ineligible discovery it applies may or may not fall within one of the statutory categories, as with products of nature²⁶¹ versus scientific principles and abstract ideas.²⁶²

Finally, it is important to understand that the exclusions from patent-eligible subject matter are not merely long-standing judicial “exceptions” from the broad statutory eligibility categories, as recently suggested by the Supreme Court in *Bilski*.²⁶³ Rather, they define the very heart of the American patent system—specifying when an eligible “invention” has been created within the statutory classes of things and processes enumerated in section 101.²⁶⁴ They reflect the *absence* of fulfillment of the critical statutory requirement of section 101 that a person “invents or discovers” one of the specified classes of subject matter, and are not exceptions to those classes of subject matter. An “exceptions” approach would suggest, under the relevant canon of statutory construction, that the exclusions from patent eligibility should be construed narrowly so as not to defeat legislative purposes.²⁶⁵ As

257. See *Diamond v. Diehr*, 450 U.S. 175, 188 (1981).

258. See *supra* notes 146–50 and accompanying text.

259. *Flook*, 437 U.S. at 594.

260. See 383 U.S. 1, 13–18 (1966).

261. Categorically excluded products of nature are normally “compositions of matter.” 35 U.S.C. § 101 (2006).

262. Cf. Lemley et al., *supra* note 12, at 1328 (“[B]ecause patent claims almost never fall *outside* of the four fundamental categories of § 101, when they do it is noteworthy.”).

263. See *Bilski v. Kappos*, 130 S. Ct. 3218, 3225–26 (2010); Chisum, *supra* note 51, at 32 (supporting *Bilski*’s language because the “very nature of an ‘exception’ suggests that it should be applied restrictively”).

264. See generally BENJAMIN KAPLAN, AN UNHURRIED VIEW OF COPYRIGHT (1967) (discussing the importance of gaps in statutory coverage to the statutory scheme and policies).

265. See, e.g., *Comm’r v. Clark*, 489 U.S. 726, 739 (1989) (“[Where] a general statement of policy is qualified by an exception, we usually read the exception narrowly in order to preserve the primary

articulated in *Chakrabarty*, “[i]n choosing such expansive terms . . . modified by the comprehensive ‘any,’ Congress plainly contemplated that the patent laws would be given wide scope.”²⁶⁶ Congress took this permissive approach to patent eligibility to ensure that “ingenuity should receive a liberal encouragement.”²⁶⁷ Similarly, in *Diehr*, the Court noted that it had “more than once cautioned that ‘courts should not read into the patent laws limitations and conditions which the legislature has not expressed.’”²⁶⁸

As discussed previously, however, the exclusions from eligibility for science, nature, and ideas—and for noninventive applications of them—not only reflect the requirement of “invention,” they also are integral to the purposes of the Patent Act and to the constitutional grant of authority to grant exclusive rights for the discoveries *of inventors* because they protect the public domain of science, nature, and ideas.²⁶⁹ These “exceptions” reflect countervailing public rights of access that also should be given “a large and liberal interpretation in order to ensure that users’ rights are not unduly constrained.”²⁷⁰ These categorical exclusions from eligibility and the requirement for additional inventive creativity in their application should therefore be warmly embraced, rather than grudgingly applied.

B. PROTECTING THE PUBLIC DOMAIN OF SCIENCE, NATURE, AND IDEAS FROM ENCROACHMENT

Prior-art treatment of new scientific, natural, and abstract discoveries makes a huge difference. It does so by precluding patents not only on the new discovery itself, but also by rendering novel but analogous (in other words, uncreative) applications of those discoveries ineligible for treatment as inventions.²⁷¹ Similarly, the new discovery

operation of the provision.”); *Spokane & Inland Empire R.R. Co. v. United States*, 241 U.S. 344, 350 (1916) (“[E]xceptions from a general policy which a law embodies should be strictly construed.”). Of course, “two inconsistent canons can usually be found for any specific question of statutory construction.” Richard A. Posner, *Statutory Interpretation—In the Classroom and in the Courtroom*, 50 U. CHI. L. REV. 800, 807 (1983).

266. *Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980).

267. *Id.* (quoting 5 WRITINGS OF THOMAS JEFFERSON 76 (H.A. Washington ed. 1871)).

268. *Diamond v. Diehr*, 450 U.S. 175, 182 (1981) (quoting *Chakrabarty*, 447 U.S. at 308) (internal quotation marks omitted).

269. See *supra* notes 47, 104, 201–31 and accompanying text.

270. *CCH Canadian Ltd. v. Law Soc’y of Upper Canada*, [2004] 1 S.C.R. 339 (Can.) at 36, available at <http://scc.lexum.org/en/2004/2004scc13/2004scc13.pdf> (discussing fair dealing for the purpose of research under section 29 of the Canadian Copyright Act). Similarly, the experimental use “exception” in patent law should not be considered an “exemption” from infringement subject to narrow construction but rather a limit to the scope of the infringement right in the first instance. See Henrik Holzapfel & Joshua D. Sarnoff, *A Cross-Atlantic Dialog on Experimental Use and Research Tools*, 48 IDEA 123, 136 (2008).

271. See *supra* notes 155–75 and accompanying text.

reveals that *preexisting* applications are not novel, as they are understood to be inherently anticipated, although newly discovered science, nature, and ideas are treated as prior art without regard to public benefit or to statutory novelty categories such as knowledge or use by others or prior making.²⁷²

Treating new discoveries as known prior art and requiring additional inventive creativity as the basis for a patent prevents the advancement of knowledge inherent in the discovery itself from supplying the required original creativity; this result may be a constitutional requirement.²⁷³ Claims merely applying the discovery to a new but analogous context would impermissibly exclude others from use of the knowledge in that context, adding nothing further to the public's store of knowledge while "lay[ing] a heavy tax"²⁷⁴ on the public for uses that should be free for all. For this reason, even *Diehr* acknowledged that the ineligibility of new discoveries "cannot be circumvented by attempting to limit [their] use . . . to a particular technological environment" and that "insignificant postsolution activity will not transform an unpatentable [scientific or natural] principle into a patentable process."²⁷⁵

Australian decisional law, by contrast, explicitly refuses to treat a new discovery as publicly known prior art when considering the creativity of claimed inventive applications, although the discovery itself ("as such" in European terms²⁷⁶) remains categorically ineligible:²⁷⁷

[An applicant's] claim for a patent is not validly answered by saying that, although there was ingenuity in his discovery . . . no ingenuity was involved in showing how the discovery, once made, might be applied. The fallacy lies in dividing up the process put forward as his invention.²⁷⁸

272. See 35 U.S.C. § 102(a), (g) (2006); *Gen. Elec. Co. v. Jewel Incandescent Lamp Co.*, 326 U.S. 242, 247 (1945); *Tilghman v. Proctor*, 102 U.S. 707, 711–12 (1880). To the extent that recent analysis of the inherency doctrine suggests that prior public benefit (rather than mere existence of the attribute later discovered) is the key to inherent novelty, the prior-art treatment of scientific and natural discoveries may be understood as extending the relevant recipients of those prior benefits to nature itself. Compare Dan L. Burk & Mark A. Lemley, *Inherency*, 47 WM. & MARY L. REV. 371, 374, 379–81 (2005), with Todd R. Miller, *Patented Compounds Inherently Coproduced as Trace Impurities: Issues of Inherent Anticipation and Literal Infringement*, 32 AIPLA Q.J. 425, 452–53 (2004).

273. See *supra* note 104 and accompanying text; see also Oskar Liivak, *The Forgotten Originality Requirement: A Constitutional Hurdle for Gene Patents*, 87 J. PAT. & TRADEMARK OFF. SOC'Y 261, 273–77 (2005).

274. *Atl. Works v. Brady*, 107 U.S. 192, 200 (1882).

275. *Diamond v. Diehr*, 450 U.S. 175, 191–92 (1981).

276. Convention on the Grant of European Patents, *supra* note 198, at art. 52(3); see *id.* art. 52(2)(a) ("The following shall not be regarded as inventions . . . : discoveries, scientific theories and mathematical methods . . .").

277. See *Nat'l Research Dev. Corp. v. Comm'r of Patents*, (1959) 102 CLR 252, 278 (Austl.) (agreeing with an earlier precedent that products of nature themselves are not patentable, regardless of the fact that "the assistance of man may be invoked for their planting and cultivation").

278. *Id.* at 252.

In further contrast, a hybrid approach has been adopted under the EPC. A “contribution” approach, similar to that of the United States, was initially adopted under the EPC but was later abandoned.²⁷⁹ However, the contributed knowledge of the discovery remains excluded from consideration, if not necessarily treated as prior art, when evaluating the “technical contribution” of the applicant for determining the existence of an “inventive step” (that is, obviousness).²⁸⁰ But as the EPC’s Board recognized, many have strongly criticized the choice to permit categorically excluded discoveries to contribute to eligibility, given that they do not contribute to patentability.²⁸¹

As articulated in *Neilson*, *Morse*, *Flook*, and now *Bilski*, new discoveries of science, nature, and ideas must be treated as if they were already known, prior art; that is, in the public domain.²⁸² The question is why we maintain this legal fiction, unlike our colleagues around the world. Although *Funk Brothers* explains that such discoveries “are part of the storehouse of knowledge of all men . . . free to all men and reserved exclusively to none,”²⁸³ no one knew what was in the storehouse before the discovery was made. Thus, some reason other than a simple prohibition on owning the knowledge itself must supply the basis for treating such discoveries as known prior art.

Significantly, the reason for prior-art treatment is that patent law does not exist to reward, and should not reward, scientific, natural, or abstract discoveries, no matter how much money, effort, and creativity went into making them or how much sacrifice went into disclosing them.²⁸⁴ As one commenter noted in 1932, “[A] scientific discoverer is

279. See Opinion of the Enlarged Board of Appeal, Case G 003/08, ¶ 10.4 (European Patent Office May 12, 2010), available at [http://documents.epo.org/projects/babylon/eponet.nsf/olDC6171F182D8B65AC125772100426656/\\$File/G3_08_Opinion_12_05_2010_en.pdf](http://documents.epo.org/projects/babylon/eponet.nsf/olDC6171F182D8B65AC125772100426656/$File/G3_08_Opinion_12_05_2010_en.pdf).

280. *Id.* ¶ 10.5. Under the EPC “contribution” approach, categorically excluded subject matter could not contribute the creativity or novelty to claimed applications for *eligibility* purposes. *Id.* ¶¶ 10.4, 10.5, 10.6. The EPC now permits eligibility for claims that employ a “technical means” or that are a “technical product,” even if all novelty and creativity lies in the excluded discovery. *Id.* ¶¶ 10.6, 10.7. But it requires that any “technical effect” for an inventive step be reflected in a “technical character” found in “all the features together” (and thus in the novel and creative application). *Id.* ¶¶ 10.7.1, 12.2.1. Where the only novel feature is nontechnical (in other words, in the categorically excluded subject matter), the claim will not be patentable. See *id.* ¶¶ 10.3, 10.4, 10.5, 10.13.1, 12.2.2, 13.5.1.

281. See *id.* ¶ 10.13 (“While the Enlarged Board of Appeal is aware that this rejection for lack of an inventive step rather than exclusion under Article 52(2) EPC is in some way distasteful to many people, it is the approach which has been consistently developed . . .”).

282. See *Bilski v. Kappos*, 130 S. Ct. 3218, 3230 (2010); *Parker v. Flook*, 437 U.S. 584, 592 (1978); *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 115–16 (1853); *Neilson v. Harford*, (1841) 151 Eng. Rep. 1266, 1267–68.

283. *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948).

284. Cf. *Risch*, *Reinventing Usefulness*, *supra* note 50, at 1222–23 (discussing the patent system’s “normative bias against basic science” and the ability to modify that bias to “aid commercial development and manufacturing with very specific uses that more immediately benefit the public”).

not a creator, since he merely lifts the veil and discloses a principle or law of nature which has always existed . . . [A]ll the proponents [of rights in scientific discoveries] recognize that the scientific discoverer should not have any monopoly of his discovery.”²⁸⁵ Even in France—where, at one point in the eighteenth century, the French had developed beliefs in the natural law rights of inventors²⁸⁶—concerted efforts made in the mid-twentieth century to protect scientific discoveries directly through patents or through *droits d’auteurs* ultimately failed.²⁸⁷ Nor does patent law exist to reward such discoveries and recoup such investments *through* eligible disclosed inventions that apply the discoveries.²⁸⁸ As noted above, prior-art treatment protects the discovery from being rewarded and constrained by piecemeal patent claims to uncreative applications.²⁸⁹

Rather, patent law exists to reward the creativity only of *eligible* principles of invention themselves, and the investments of money, effort, and disclosure made *in the creative applications alone*. As *Flook* states, patent-eligible inventions must reflect some “other inventive concept” than mere application of the new discovery.²⁹⁰ It is the other inventive concept, and only that concept, that is to be rewarded by a patent, and the breadth of patent protection consequently should be coextensive

285. Holmes, *supra* note 23, at 1432; *see also In re Bilski*, 545 F.3d 943, 1013 (Fed. Cir. 2008) (en banc) (Rader, J., dissenting) (“Natural laws and phenomena can never qualify for patent protection because they cannot be invented at all. After all, God . . . provided these laws and phenomena as humanity’s common heritage. Furthermore, abstract ideas can never qualify for patent protection because the Act intends, as section 101 explains, to provide ‘useful’ technology. An abstract idea must be applied to (transformed into) a practical use before it qualifies for protection.”).

286. *See* C.H. Greenstreet, *History of Patent Systems*, in MAINLY ON PATENTS: THE USE OF INDUSTRIAL PROPERTY AND ITS LITERATURE 13 (Felix Liebesny ed., 1972) (“[I]t would be a violation of the rights of man in their very essence if an industrial *invention* were not the property of its *creator*.” (translating the 1790 French patent law) (emphasis added)); MACLEOD, *supra* note 227, at 199 (“The National Assembly, in 1790, declared that ‘it would be a violation of the Rights of Man . . . not to regard an industrial discovery as the property of its author.’” (quoting Frank D. Prager, *A History of Intellectual Property from 1545 to 1787*, 26 J. PAT. OFF. SOC’Y 711, 756 (1944))); *cf.* Thomas M. Meshbesh, *The Role of History in Comparative Patent Law*, 78 J. PAT. & TRADEMARK OFF. SOC’Y 594, 607 (1996) (“[T]he French Revolution engendered a desire to base French patent law upon a natural law, rights-of-man concept . . . but this idea acquired no supporters outside of France, and even the French backed away from the idea four years later.”).

287. *See, e.g.*, HAMSON, *supra* note 23, at 20–29.

288. Federal Circuit Judge Newman has come close to articulating this competing vision in the context of the written-description requirement. *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1359 (Fed. Cir. 2010) (en banc) (Newman, J., additional views) (“[T]he threshold in all cases requires a transition from theory to practice, from basic science to its application, from research plan to demonstrated utility. . . . Basic scientific principles are not the subject matter of patents, while their application is the focus of this law of commercial incentive. The role of the patent system is to encourage and enable the practical applications of scientific advances, through investment and commerce. . . . The practical utility on which commercial value is based is the realm of the patent grant. . . .”).

289. *See supra* notes 23–24, 241 and accompanying text.

290. *Parker v. Flook*, 437 U.S. 584, 594 (1978).

therewith, as *Dolbear* confirms²⁹¹ and as *Benson* less coherently sought to establish.²⁹² By remaining free from private patent property rights, the discovery avoids acting as a pioneering “blocking patent”²⁹³ that dominates both the applicant’s and the public’s creative applications. The categorical exclusions prevent claims to the discoveries themselves, which would provide exclusivity over all “mak[ing]” of things employing or “uses” applying the discoveries.²⁹⁴ But a claim for a noncreative application of a discovery would effectively stake out the same territory, just on a more limited scale. The creativity of making the discovery itself would then impose patent costs on all claimed uses of the uncreative, but more limited, application. In contrast, treating the discovery as if already known avoids indirectly imposing patent-system costs on using the discovered knowledge, both for ineligible uncreative and patentable creative applications.

Direct patent-system incentives are thus prohibited for making and disclosing new scientific, natural, and abstract discoveries. Nevertheless, in some cases patent-system incentives for making and disclosing eligible creative *applications* will prove sufficient for also making and disclosing the ineligible discoveries.²⁹⁵ But even when they do not, the consequence is not necessarily the underproduction or underdisclosure of scientific, natural, and abstract discoveries, which is and should remain a serious concern given that these discoveries are non-excludable public goods.²⁹⁶ Rather, the consequences will depend on the adequacy of non-patent incentives and funding to make and disclose such ineligible discoveries.²⁹⁷

291. See, e.g., *Dolbear v. Am. Bell Tel. Co.*, 126 U.S. 1, 534–35 (1888). Thus, although the “abstract idea must be applied to (transformed into) a practical use,” it is the inventive concept in the “transformation” and not the transformed idea itself that is protected. *In re Bilski*, 545 F.3d 943, 1013 (Fed. Cir. 2008) (Rader, J., dissenting).

292. See *Gottschalk v. Benson*, 409 U.S. 63, 72 (1972) (“[I]n practical effect [it] would be a patent on the algorithm itself. It may be that the patent laws should be extended to cover these programs, a policy matter to which we are not competent to speak.”).

293. *Ariad Pharms.*, 598 F.3d at 1365 (Rader, J., dissenting in part and concurring in part) (citing *Prima Tek II, L.L.C. v. A-Roo Co.*, 222 F.3d 1372, 1379 n.2 (Fed. Cir. 2000)); see also Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 909–11 (1990).

294. See 35 U.S.C. § 271(a) (2006); see also Holzapfel & Sarnoff, *supra* note 270, at 173 (discussing “absolute” protection beyond conceived or disclosed embodiments or uses).

295. Cf. Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031, 1032 (2005) (“[T]he effort to permit inventors to capture the full social value of their invention—and the rhetoric of free riding in intellectual property more generally—are fundamentally misguided. In no other area of the economy do we permit the full internalization of social benefits.”).

296. See generally RICHARD CORNES & TODD SANDLER, *THE THEORY OF EXTERNALITIES, PUBLIC GOODS, AND CLUB GOODS* 39–290 (2d ed. 1996); Joseph E. Stiglitz, *Knowledge as a Public Good*, in *GLOBAL PUBLIC GOODS: INTERNATIONAL COOPERATION IN THE 21ST CENTURY* (I. Kaul et al. eds., 1999).

297. To some extent, these concerns reflect differences of faith in market and nonmarket approaches to innovation. Cf. Michael W. Carroll, *One Size Does Not Fit All: A Framework for Tailoring Intellectual Property Rights*, 70 OHIO ST. L.J. 1361, 1396–98 (2009) (citing, *inter alia*, Henry E. Smith, *Intellectual Property as Property: Delineating Entitlements in Information*, 116 YALE L.J.

These are not necessarily inadequate even though discoverers will not obtain directly, through patent property rights, any social benefits of the discoveries themselves.²⁹⁸ And even if underproduction or underdisclosure were to result, contrary to historic beliefs in the confluence of utilitarian and deontological grounds for limiting the patent system,²⁹⁹ the religious and moral concerns engendered might nevertheless be more politically salient.³⁰⁰

In sum, without prior-art treatment or by otherwise permitting the piecemeal claiming of noncreative applications of ineligible discoveries, the discoverer *effectively* would be rewarded for the discovery itself. By claiming either uncreative pure methods or many less broad but equally uncreative specific applications, the applicant would approximate as a matter of legal claim-drafting skill an ineligible claim to the discovery itself.³⁰¹ Determining ineligible subject matter based on preemptive scope rather than on sufficient creativity therefore reflects, and has properly been criticized for duplicating, concerns similar to section 112, paragraph 1 commensurability evaluations,³⁰² in which the scope of the claim for exclusion is measured against the scope of the inventive principle described and enabled in the specification.³⁰³ But such duplication does not exist for eligibility approaches focused on the required degree of

1742, 1748 (2007); Clarisa Long, *Information Costs in Patent and Copyright*, 90 VA. L. REV. 465, 466–71 (2004)) (discussing administrative costs and uniformity versus tailoring of intellectual property rights through public or private ordering).

298. See, e.g., Harold Demsetz, *The Private Production of Public Goods*, 13 J.L. & ECON. 293, 295 (1970) (discussing property rights and public goods production); Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257, 272–73 (2007) (same); cf. Samuelson & Schultz, *supra* note 47, at 117–20 (discussing as a criterion to determine abstractness the adequacy of market incentives for creation of many business and service processes, the lack of significant R&D investments, and diffuse and collaborative production).

299. See *supra* notes 238–39239 and accompanying text.

300. See *supra* notes 200–41 and accompanying text. See generally Shobita Parthasarathy, *Breaking the Expertise Barrier: Understanding Activist Strategies in Science and Technology Policy Domains*, 37 SCI. & PUB. POL'Y 355 (2010).

301. The one potential limit to this is through the rare application of the reverse doctrine of equivalents, where the claimed application is seen as so different that it should not be viewed as applying the same inventive concept. See, e.g., *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 557–67, 573 (1898); *Merges & Nelson*, *supra* note 293, at 860–68.

302. See, e.g., *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1360 (Fed. Cir. 2010) (en banc) (Newman, J., additional views) (“[T]he patentee is obliged to describe and to enable subject matter commensurate with the scope of the exclusionary right.”).

303. See, e.g., *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 868 (Fed. Cir. 2010) (“[T]he Supreme Court [in *Bilski*] advised that section 101 eligibility should not become a substitute for a patentability analysis related to prior art, adequate disclosure, or the other conditions and requirements of Title 35.”); *In re Bilski*, 545 F.3d 943, 996 (Fed. Cir. 2008) (en banc) (Newman, J., dissenting) (“If a claim is unduly broad, or if it fails to include sufficient specificity, the appropriate ground of rejection is Section 112, for claims must ‘particularly point out and distinctly claim[]’ the invention. . . . The filing of a broader claim than is supported in the specification does not convert the invention into an abstraction and evict the application from eligibility for examination.” (internal citations omitted)); see also *supra* note 51.

creativity (although, as discussed below, duplication may exist with regard to obviousness analysis).

While concerns over claim scope and preemption are significant and warrant continued scrutiny, they address principally the proportionality of *both* sides of the patent bargain equation (the “quid pro quo”),³⁰⁴ rather than specifying the value and kind of disclosure qualifying as an eligible invention in the first instance (the first side of the equation). Unless such proportionality analyses are based ultimately on non-scope policy factors—for example, deciding that exclusive rights incentives simply are not needed for particular kinds of inventions, such as those outside of the useful arts—they cannot support meaningful line drawing for eligibility.

As recognized by the Supreme Court in both *Diehr* and *Flook*, adding noninventive limitations to claims that restrict scope can avoid preempting all applications; disclosing the full scope of what is claimed will avoid disproportionality under section 112, but it cannot supply eligibility to otherwise ineligible discoveries.³⁰⁵ Insignificant additional structures, trivial physical transformations, field-of-use restrictions, or other noninventive claim limitations may reflect legal skill, but they do not impart patent eligibility.³⁰⁶ As Justice Breyer recognized in the *Laboratory Corporation* case, artful drafting of such additional limitations to the use of natural discoveries may add “nothing . . . of significance.”³⁰⁷ Of course, where the claim is disproportionate to the inventive contribution, it may fail both for lack of invention and on the overall proportionality balance. Given that new discoveries must be treated as prior art, it is no surprise that the preemption approach finds to be ineligible claims that effectively exclude all uses of the new discoveries. It

304. *Ariad Pharms.*, 598 F.3d at 1353–54 (“[Section 112, first paragraph] ‘ensure[s] that the scope of the right to exclude, as set forth in the claims, does not overreach the scope of the inventor’s contribution to the field of art as described in the patent specification.’ . . . It is part of the *quid pro quo* of the patent grant. . . .” (quoting *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 920 (Fed. Cir. 2004) (citing *Enzo Biochem, Inc. v. Gen-Probe, Inc.*, 323 F.3d 956, 970 (Fed. Cir. 2002)))).

305. *See* *Diamond v. Diehr*, 450 U.S. 175, 192 n.14 (1981) (“The claims [in *Flook*], however, did not cover every conceivable application of the formula. We rejected in *Flook* the argument that because all possible uses of the mathematical formula were not pre-empted, the claim should be eligible for patent protection.”); *Parker v. Flook*, 437 U.S. 584, 590 n.11 (1978) (“[I]t is not entirely clear why a process claim is any more or less patentable because the specific end use contemplated is the only one for which the algorithm has any practical application.”).

306. *See, e.g., Diehr*, 450 U.S. at 191–92; *Flook*, 437 U.S. at 590; *Gottschalk v. Benson*, 409 U.S. 63, 70, 72 (1972).

307. *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124, 138 (2006) (Breyer, J., dissenting from dismissal of certiorari) (noting the restrictions on the claim’s scope and physical transformations in performing the process); *see Benson*, 409 U.S. at 72 (referring to such artful claim drafting as “direct attempts” to claim computer programs).

is the more limited, uncreative applications that pose the greatest problems regarding eligibility theories.³⁰⁸

Similarly, the machine-or-transformation framework provides no “clue” at all for making eligibility determinations,³⁰⁹ as it lacks any theory of the function that “the patent laws were [and were not] designed to protect.”³¹⁰ The machine-or-transformation framework is thus incapable of principled application, as well as underinclusive and overinclusive of the requisite inventive creativity.³¹¹ In contrast, analogical reasoning from past precedents, from which the machine-or-transformation framework was derived,³¹² can help to suggest the kinds and degrees of required creativity for eligibility. But analogic reasoning is helpful only when the analogies are apt, which requires judgments of similarity of context that may predetermine the outcomes. And in contexts thought to be non-analogous, or markedly different, decisionmaking must be guided by direct application of the relevant criteria.

The criteria for sufficient creativity must therefore be specified in order to assess whether new types of claimed subject matter are eligible, so that the patent system does not deprive the public of its rights to the public domain of science, nature, and ideas; that is, unless and until Congress deprives the public of such rights and the power to do so is not found to be prohibited to it by the Constitution.³¹³ In contrast, further legislative (and possibly judicial) eligibility restrictions, unless made substantially prospective in application, might pose constitutional takings challenges.³¹⁴

C. THE ACTUAL RELATIONSHIP BETWEEN PATENT ELIGIBILITY AND OBVIOUSNESS (AND OTHER PATENTABILITY DOCTRINES)

Once one recognizes that both patent eligibility under section 101 and patentability under section 103 require inventive creativity, and that even newly discovered science, nature, and ideas must be treated as prior art, the relationship between patent eligibility and patentable non-

308. *But see supra* note 19 and accompanying text.

309. *Bilski v. Kappos*, 130 S. Ct. 3218, 3227 (2010) (quoting *Benson*, 409 U.S. at 71).

310. *Diehr*, 450 U.S. at 192.

311. *See CASRIP Bilski* Brief, *supra* note 67, at 21–29; *supra* notes 249–54 and accompanying text; *cf. Samuelson & Schultz, supra* note 47, at 112–19 (discussing various “clues” to eligibility, based on a range of different considerations designed to distinguish abstract ideas from eligible inventions, such as level of abstraction, preemption, mental processes, wide-ranging impact, and the Constitution’s “emphasis on promoting progress”).

312. *See supra* notes 131–35 and accompanying text.

313. *Cf. Golan v. Holder*, 609 F.3d 1076 (10th Cir. 2010), *cert. granted*, 131 S. Ct. 1600 (2011).

314. *See generally* *Stop the Beach Renourishment Inc. v. Fla. Dept. of Env’tl Protection*, 130 S. Ct. 2592 (2010); Davida H. Isaacs, *Not All Property Is Created Equal: Why Courts Resist Applying the Takings Clause to Patents, and Why They Are Right to Do So*, 15 *Geo. Mason L. Rev.* 1 (2007); Adam Mossoff, *Patents as Constitutional Private Property: The Historical Protection of Patents Under the Takings Clause*, 87 *B.U. L. Rev.* 689 (2007).

obviousness becomes apparent. If an application of newly discovered science, nature, and ideas is not an “invention,” it also cannot be a “non-obvious” invention.³¹⁵ In contrast, it is possible for novel applications of science, nature, and ideas to qualify as sufficiently creative inventions for eligibility. Such inventions in theory might not qualify as non-obvious, patentable inventions, if lacking the requisite *kind or degree* of creativity to warrant granting exclusive rights. The Supreme Court in *Graham*, however, suggested that Congress intended no change to the level of inventive creativity required for patents when it created the non-obviousness standard of section 103 for application to prior art as defined by section 102.³¹⁶ Thus, any claim to categorically excluded subject matter or any claim that lacks invention in applying such subject matter should also *necessarily* be obvious, that is, so long as the categorically excluded subject matter is treated as prior art for both eligibility and patentability. Court statements and legal arguments that Congress intended section 101 to preserve broad eligibility and that section 101 should be construed so as to effectuate that purpose³¹⁷ thus miss the mark. There is simply no point in preserving breadth of coverage under section 101 for what must *necessarily* be unpatentable and obvious because it lacks any invention. This is true even if the claims recite machines, manufactures, compositions of matter, or processes.

The categorically ineligible subject matter thus makes no contribution to the eligibility of the invention,³¹⁸ and also should not contribute to patentability when assessing obviousness.³¹⁹ Allowing contributions to be considered for patentability but not for eligibility (because section 102 does not define new but ineligible discoveries as prior art) can only lead to patent-system errors. Such errors can arise by granting patents on claims that, if the contributions do not matter, should be considered both ineligible and unpatentable. Or they can arise by

315. Cf. Chisum, *supra* note 51, at 22–23 (noting that the Supreme Court in *Bilski* could have relied on obviousness to reject the claims, as it did in *Dann v. Johnston*, 425 U.S. 219 (1976), and as it could do for many “business methods and biomedical discoveries,” including claims resulting from “the application of known techniques to isolate valuable biological subject matter”). Chisum, however, did not discuss the prior-art treatment of the discovery, which may be what makes the application or isolated material obvious.

316. See 35 U.S.C. §§ 102, 103(a) (2006); *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); see also *supra* note 178 and accompanying text.

317. See, e.g., *Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010); *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 867–68 (Fed. Cir. 2010); Brief for Petitioners at 18–20, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (No. 08-964).

318. See *Parker v. Flook*, 437 U.S. 584, 591–92 (1978) (“The process itself, not merely the mathematical algorithm, must be new and useful. Indeed, the novelty of the mathematical algorithm is not a determining factor at all.” (citing *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 94 (1939))); *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972); *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948)).

319. Cf. *supra* note 196 and accompanying text.

excluding claims that, if the contributions do matter, should be considered potentially eligible and patentable. Such errors are even more likely when different levels of creativity are required for eligibility and patentability, and it is hard to imagine why patentability could or should require *less* creativity than is required for eligibility.

Given the inevitable unpatentability of claims lacking an eligible invention, it also becomes evident that it is the prior-art treatment of categorically excluded subject matter that really troubles those who believe in an expansive patent system. Such believers would be no happier if clearer legal rules of *unpatentability* for obviousness were developed based on the prior-art status of such discoveries.³²⁰ But it is for patent eligibility that the Supreme Court has encouraged the lower courts to develop such rules.³²¹ The Federal Circuit appears reluctant to do so on its own,³²² and we will see if they are willing to acquiesce in any adjudicatory rules that the PTO may develop in the Board of Patent Appeals and Interferences, so long as the PTO continues to lack substantive rulemaking powers.³²³ And unless they abandon the preemption or machine-or-transformation approaches, the courts and the PTO will continue to confront the prior-art status issue when addressing the obviousness of claims that are found to be eligible.

The prior-art treatment of categorically excluded subject matter also explains the relationship between section 101 and section 102, and between section 101 and the first and second paragraphs of section 112.³²⁴ In contrast, prior-art treatment does not resolve the question of how much and what kind of additional “utility,” to the marked differences or non-analogous uses required for an eligible invention, may also be required for patentability under section 101.³²⁵ Given that the categorically excluded subject matter is treated as prior art, any claim to such subject matter itself cannot be novel. Section 102, like section 101, refers to “inventions,” and the lack of novelty for excluded subject

320. Cf. Joshua D. Sarnoff, Bilcare, KSR, *Presumptions of Validity, Preliminary Relief, and Obviousness in Patent Law*, 25 CARDOZO ARTS & ENT. L.J. 995, 1027–30, 1041–43 (2008) (citing *KSR Int'l Co. v. Teleflex, Inc.*, 505 U.S. 398, 416–17 (2007)) (discussing how the Supreme Court may have created a conclusive legal rule or a presumption of obviousness for combinations of prior-art elements shown to lack a new function); Keith Perine, *Patent Overhaul Provisions May Complicate Tax Preparation*, CQ TODAY (Feb. 2, 2011) (discussing opposition to legislation proposing to treat tax liability methods as prior art for the purposes of obviousness analysis, which purportedly would adversely affect innovation, investment, and competitiveness in the financial software products industry (quoting Rey Ramsey, President of the TechNet coalition)).

321. See *Bilski*, 130 S. Ct. at 3229.

322. See *Research Corp. Techs.*, 627 F.3d at 868.

323. See, e.g., *Tafas v. Doll*, 559 F.3d 1345, 1352–53 (Fed. Cir. 2009), *vacated*, 328 Fed. App'x 658 (Fed. Cir. 2009).

324. See 35 U.S.C. §§ 101, 102, 112 ¶¶ 1, 2 (2006).

325. Cf. Risch, *New Uses for Patent Utility*, *supra* note 32, at 5–10 (discussing operable, practical, and commercial usefulness, and timing and measurement issues in assessing utility).

matter exists without regard to the specific listed events that would otherwise be required to place such knowledge in the public domain (for example, “known or used by others”).³²⁶ Once the applicant discloses the knowledge of the discovery in the patent application, the public effectively receives the benefit of that knowledge retroactively, at least for science and nature, which are inherent to the world; the applicant therefore cannot be considered the first inventor of such knowledge.³²⁷ Claims reflecting applications of the newly discovered science, nature, or ideas in *previously existing* products or processes that had unknowingly incorporated them, moreover, would lack any novel invention based on traditional inherency doctrine.

The mismatch between an insufficient inventive disclosure and the exclusive breadth of a claimed application is traditionally policed by section 112, paragraph 1, through the written-description and enablement requirements.³²⁸ As noted by the Supreme Court in *Morse*, because claims to categorically excluded subject matter are not the claimants’ inventions, they also cannot legally be “described” as “invented” by the applicant.³²⁹ Thus, such claims may violate *both* sections 101 and section 112.³³⁰ But the same is true for noninventive applications of science, nature, and ideas, which also are not “inventions.” Conversely, so long as the description and claim match the applicant’s actual invention, which permissibly may include only sufficiently creative applications of newly discovered science, nature, and ideas, neither section 101 nor section 112

326. 35 U.S.C. § 102(a).

327. See *supra* note 272 and accompanying text; cf. *Alexander Milburn Co. v. Davis-Bournonville Co.*, 270 U.S. 390, 399–401 (1926) (discussing the defense in the predecessor act that the applicant was not the “first inventor,” and noting that a description filed in an earlier patent application by another can “show[] that [the current applicant] was not the first inventor,” which rule was subsequently codified as amended at 35 U.S.C. § 102(e)).

328. See, e.g., Vincent Chiapetta, *Patentability of Computer Software Instruction as an “Article of Manufacture:” Software as Such as the Right Stuff*, 17 J. MARSHALL J. COMPUTER & INFO. L. 89, 164 (1998) (discussing “two different kinds of abstraction,” failure to put to any practical use, and vagueness, with the latter relating to how (rather than in what context) to implement the claim and triggering section 112 paragraph 1 enablement concerns); Chisum, *supra* note 51, at 21 (“The purpose of the [written-description requirement] . . . is very similar to that given by the Supreme Court in defense of the Section 101 ‘abstract-ideas’ exception. . . . [precluding] patents for (1) ‘basic research, including research into scientific principles and mechanisms of action,’ as opposed to ‘the practical implications of . . . such research,’ (2) ‘for academic theories, no matter how groundbreaking or necessary to the later patentable inventions of others’ and (3) ‘research plans,’ which ‘impose costs on downstream research.’” (quoting *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1353 (Fed. Cir. 2010) (en banc))); Chisum, *supra* note 51, at 19 (noting that enablement is the “primary claim-scope regulator”); *supra* note 135 and accompanying text.

329. *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 113 (1853) (“In fine he claims an exclusive right to use a manner and process which he has not described and indeed *had not invented*, and therefore *could not describe* when he obtained his patent.” (emphasis added)).

330. See, e.g., *Holland Furniture Co. v. Perkins Glue Co.*, 277 U.S. 245, 257 (1928) (“That the patentee may not by claiming a patent on the result or function of a machine extend his patent to devices or mechanisms not described in the patent is well understood.”).

written-description requirements should pose any constraint on patent eligibility or on patentability.³³¹ Nevertheless, such descriptions might not enable others to make and use the full scope of the claimed eligible invention, under whatever is the proper standard of permissible “experimentation” required to do so.³³²

Indefiniteness under section 112, paragraph 2, is sometimes raised as a concern, particularly in regard to the eligibility of claims applying abstract ideas.³³³ As with written description, so long as the claims are limited to creative applications that are clearly claimed, neither definiteness nor eligibility should be an issue. In contrast, even creative applications may not be clearly claimed, and indefiniteness concerns may remain. Definiteness thus is not a substitute for eligibility analysis. Further, claims to categorically excluded subject matter and to noncreative applications thereof are not claims for “inventions,” and thus the claims may not objectively match what the applicant “regards as his invention,” even when their subject matter is susceptible to being “particularly point[ed] out and distinctly claim[ed].”³³⁴

In sum, section 101 establishes the subject matter of claims that qualify as patent-eligible “inventions,” rather than as categorically ineligible discoveries and noncreative applications of them. It is these, and only these, inventions that are supposed to be measured against the prior art (which includes newly discovered but ineligible discoveries) for

331. See, e.g., *J.E.M. AG Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 133–35 (2001) (noting that the Plant Patent Act was not meant to exclude plant protection under the predecessor to section 101, even though plants were not then thought to fall within that provision); *Diamond v. Chakrabarty*, 447 U.S. 303, 311–12 (1980) (noting that before 1930, artificially bred plants were thought to be both products of nature and incapable of an adequate written description, and that the Plant Patent Act changed the view of their status and relaxed the written-description requirement).

332. Cf., e.g., *Ariad Pharms.*, 598 F.3d at 1367 (Linn, J., dissenting in part and concurring in part) (citing *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988)) (noting the current “undue experimentation” standard of enablement, requiring commensurability assessments for the making and use of the claim by others); see also Sarnoff, *supra* note 135, at 466–67 (discussing *The Incandescent Lamp Patent* at issue in *Consolidated Electric Light Co. v. McKeesport Light Co.*, 159 U.S. 465 (1895), and discussing *Holland Furniture Co.*, 277 U.S. 245).

333. See, e.g., Amicus Curiae Brief of the Federal Circuit Bar Ass’n Urging Reversal, *In re Beauregard*, 53 F.3d 1583 (Fed. Cir. 1995) (No. 95-1054), reprinted in 5 FED. CIR. B.J. 107, 117 (1995) (citing Application of Musgrave, 431 F.2d 882, 893 (C.C.P.A. 1970)) (encouraging the court to decide section 112 definiteness before reaching section 101 eligibility for means-plus-function claims); Wesley L. Austin, *Software Patents*, 7 TEX. INTELL. PROP. L.J. 225, 245 (1999) (discussing one claim rejected by the PTO for indefiniteness while others were rejected as ineligible for abstractness in *In re Warmerdam*, 33 F.3d 1354, 1358–60 (Fed. Cir. 1994)); cf. *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 869 (Fed. Cir. 2010) (“[A] patent that presents a process sufficient to pass the coarse eligibility filter may nonetheless be invalid as indefinite because the invention would ‘not provide sufficient particularity and clarity to inform skilled artisans of the bounds of the claim.’” (citing *Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 537 F.3d 1357, 1371 (Fed. Cir. 2008))).

334. 35 U.S.C. § 112, ¶ 2 (2006); see *Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1380 (Fed. Cir. 2000) (generally requiring objective evidence, rather than subjective inventor testimony, to assess what the applicant regarded as the invention).

novelty under section 102; for obviousness under section 103; and under section 112 for commensurability of the disclosure of that invention to the breadth of claimed exclusion, for conformity to the applicant's subjective understanding, and for precision of claims in supplying public understanding and notice. Claimed noncreative applications of science, nature, and ideas will remain ineligible *and* unpatentable because they are not inventions or discoveries within the meaning of the statute, even though they are novel, not inherent in section 102-defined prior art, sufficiently described, capable of being made and used by others, and limited to what the applicant believed was inventive and clearly claimed to supply public notice. Section 101 thus performs a role that sections 102 and 112 cannot. In contrast, so long as new discoveries are treated as if they were prior art, section 103 necessarily should also render ineligible uncreative applications unpatentable as obvious. But there are good reasons to rely on threshold eligibility determinations rather than obviousness decisions to keep these claims out of the patent system.

III. THE (MOSTLY) UTILITARIAN BENEFITS OF THRESHOLD ELIGIBILITY EXCLUSIONS AND CLEARER CRITERIA

Three general kinds of efficiency benefits are provided by applying section 101 eligibility criteria as a “threshold” determination.³³⁵ These are reduced costs of administration, reduced overall burdens on the patent system, and clearer signals that direct investment and innovation to activities that most need patent-system incentives while better protecting the public domain of science, nature, and ideas from encroachment.³³⁶ Given broader recognition of the prior-art treatment of categorically excluded discoveries and the consequent need for invention in their application, these benefits should become more transparent. Objections to using categorical eligibility rules in a gatekeeping role based on the perceived duplication or on the asserted superiority of other patentability criteria,³³⁷ and particularly arguments based on the ability to further develop the factual record during search and examination so as to make better judgments,³³⁸ simply fall wide of the mark. And, given recognition of the need for invention in the application, so are objections that relying

335. See, e.g., *Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010); *Diamond v. Diehr*, 450 U.S. 175, 213 (1981) (Stevens, J., dissenting); cf. *Diehr*, 450 U.S. at 189–90 (majority opinion) (noting that section 101 decisions on eligibility are separate from determinations of the “conditions and requirements” of patentability).

336. See *infra* Parts III.A.–C.

337. See *supra* notes 17–20 and accompanying text; cf. Risch, *Forward to the Past*, *supra* note 17, at 364 (noting arguments for eligibility as a “proxy” for other criteria, and criticizing such arguments for failing to provide accurate rules for determining which claims should be disallowed).

338. See, e.g., Chisum, *supra* note 51, at 31.

on threshold eligibility determinations will keep out of the patent system particular claims or “entire areas of invention” that *should be* allowed.³³⁹

First, because determining the existence of an “invention” is a predicate to most subsequent patentability determinations, eliminating at the outset claims that lack the minimally required creativity for invention is typically an easier and more efficient determination, which will reduce overall burdens of evaluation on the patent system. Thus, the practical effect of eligibility doctrine *could and should be* to exclude and discourage many claimed applications in fields in which invention requires more creativity than is routinely supplied.³⁴⁰ Making such threshold eligibility determinations will not result in wasted effort so long as resorting to an eligibility determination is not required when rejection on other grounds is clearly more efficient.³⁴¹ Second, such eligibility determinations will discourage the filing of claims for applications reflecting more clearly identified insufficient creativity, which will then provide the benefit of reducing the overall burden on the patent system. Third, and relatedly, excluding at the threshold insufficiently creative claims will send the right signals to direct investment, effort, invention, and disclosure towards more creative, and thus also potentially patentable, activities. This should lead to more rapid development of the prospects marked out by the discovery and disclosure of the categorically ineligible science, nature, and ideas.³⁴² Each of these sets of benefits is briefly discussed below.

Of course, this only raises the more significant question of whether mere applications of new discoveries *should be* allowed to be patent eligible and patentable. Eliminating prior-art treatment of categorically excluded discoveries arguably might better encourage the identification of such discoveries and consequent development of both creative and uncreative applications, providing the public with concrete social benefits.³⁴³ Similarly, the exclusions for science, nature, and ideas might

339. Lemley et al., *supra* note 12, at 1342.

340. *Cf. Bilski*, 130 S. Ct. at 3253–55 (Stevens, J., concurring) (discussing constitutional concerns with granting patents on business methods given arguments against the necessity for further encouraging business innovations); *supra* note 298.

341. *See, e.g., In re Bilski*, 545 F.3d 943, 951 n.1 (Fed. Cir. 2008) (en banc) (noting that there is no requirement to address section 101 analysis before rejecting on other grounds, but “given that § 101 is a threshold requirement, claims that are clearly drawn to unpatentable subject matter should be identified and rejected on that basis”).

342. *See, e.g., Merges & Nelson, supra* note 293, at 843 (providing a theoretical and empirical analysis of “whether technical advance proceeds more vigorously and effectively under competition or under a regime where one person or organization has a considerable amount of control over developments”); *id.* at 843–44 (“[T]he law should attempt at the margin to favor a competitive environment for improvements, rather than an environment dominated by the pioneer firm.”). *See generally* John H. Barton, *Patents and Antitrust: A Rethinking in Light of Patent Breadth and Sequential Innovation*, 65 ANTITRUST L.J. 449 (1997).

343. *See, e.g., Lemley et al., supra* note 12, at 1329 (“The abstract ideas exception should disallow

be abandoned on the belief that centralized rather than decentralized development of fundamental discoveries will lead to greater scientific and technological progress,³⁴⁴ or beliefs that section 101 decisions should be based solely on whether the claim “forecloses” (preempts) too much “follow-on-invention.”³⁴⁵ Such approaches raise more fundamental innovation-policy challenges to the eligibility rules of the current patent system, and lead to questions about how society will fund the basic research and development that currently results in the public domain, prior-art treatment of science, nature, and ideas.

The effects of the patent system on innovation—and of particular exclusions from it or of particular levels of protection provided by it—are highly uncertain and contested.³⁴⁶ Particularly in regard to the issue of business method eligibility, two economists recently argued to the Supreme Court in *Bilski* that

[e]conomic research has shown that the relationship between patent protection and innovation is complex

. . . .

Economic evidence indicates that the social costs of business method patents are significant and the social benefits are small compared to those costs.

. . . .

Empirical evidence reveals both negative and positive effects of patents on the pace of cumulative innovation.

. . . .

There is at present very little evidence to argue that business method patents have had a significant effect on the R&D investments of financial institutions.

. . . .

those claims to ideas unmoored to real-world applications.”).

344. See, e.g., Risch, *Everything Is Patentable*, *supra* note 14, at 591–93. *But cf.* Chisum, *supra* note 51, at 29. (“Who can object to barring patents when all the ‘inventor’ contributes is formulation of an abstract idea or discovery of a natural phenomenon?”). See generally John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439 (2004); F. Scott Kieff, *Coordination, Property, and Intellectual Property: An Unconventional Approach to Anticompetitive Effects and Downstream Access*, 56 EMORY L.J. 327 (2006); Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977).

345. Lemley et al., *supra* note 12, at 1329–30; see *id.* at 1339–41 (discussing industry and claim-specific factors regarding such preclusion).

346. See, e.g., Machlup, *supra* note 61, at 14, 56, 62, 80; Risch, *Everything Is Patentable*, *supra* note 14, at 594 (“[I]t is simply too hard to identify, let alone measure the effect of subject matter rules on innovation.”); Rudolph J.R. Peritz, *Patents and Progress: The Economics of Patent Monopoly and Free Access* 1, 10 (July 21, 2008), available at http://www.nyls.edu/centers/harlan_scholar_centers/institute_for_information_law_and_policy/publications/ (discussing inconclusive studies conducted since Fritz Machlup and since Kenneth Arrow’s similarly inconclusive theoretical analysis). See generally JOHN R. THOMAS, CONG. RESEARCH SERV., 7-5700, CURRENT ISSUES IN PATENTABLE SUBJECT MATTER: BUSINESS METHODS, TAX PLANNING METHODS, AND GENETIC MATERIALS 13–15 (2011) (discussing and surveying recent analyses and arguments for and against expansive patentable subject matter).

Empirical studies indicate that software patents have not stimulated software research.

....

There is little evidence that [patents induce firms to disclose inventions that would otherwise be kept secret] significant[ly or at all].³⁴⁷

But whatever the merits of these arguments about *areas* of endeavor, the benefits and risks of extending the patent system to *fundamental* knowledge poses more serious concerns. This is because of the breadth of potential, and potentially unknown, applications of those discoveries.

As discussed above, the categorical exclusions for science, nature, and ideas were adopted specifically to protect and promote such fundamental discoveries; prior-art treatment prevents imposing the costs of funding those discoveries on both the uncreative and the creative applications that patents on such fundamental knowledge would dominate.³⁴⁸ Eliminating the categorical exclusions or their prior-art status is thus a very high-risk utilitarian innovation strategy.

Further, innovation policy is not the only, and may not be the most significant, value at stake. There is an integral relationship of the exclusions for science, nature, and ideas to historic religious beliefs regarding nature and the role humans play in understanding and shaping it.³⁴⁹ As noted above, these concerns may be incommensurable with utilitarian morality, but they are no less significant politically.³⁵⁰ Eliminating the categorical exclusions or their prior-art status would extend the patent system well beyond its current and already highly controversial limits. It might permit patents on nature itself, including human biology, or on all sorts of other knowledge for which there may be no, or wholly inadequate, substitutes or design-arounds.³⁵¹ It also might create the equivalent of patent thickets with a single patent,³⁵² no matter how creative synthetic biology and bioinformatics, theoretical

347. Brief Amici Curiae of Professors Peter S. Menell & Michael J. Meurer in Support of Respondent at 30–32, 36–38, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (No. 08-964) (citations omitted).

348. See *supra* notes 293–94 and accompanying text.

349. See SARNOFF, *supra* note 48 (discussing why deontological moral concerns continue to matter for patent eligibility decisions).

350. See *supra* notes 53–58, 300 and accompanying text.

351. See, e.g., *State Indus., Inc. v. A.O. Smith Corp.*, 751 F.2d 1226, 1236 (Fed. Cir. 1985) (noting the incentive to design around patents as an incentive to bring useful innovations to the market); Craig A. Nard, *Certainty, Fence Building, and the Useful Arts*, 74 IND. L.J. 759, 760 (1999) (discussing the relationship of design-arounds and competition); *supra* notes 219–21 and accompanying text.

352. See, e.g., Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 700 (1998) (arguing that the grant of too many patents is causing licensing failures). But see, e.g., David E. Adelman & Kathryn L. DeAngelis, *Patent Metrics: The Mismeasure of Innovation in the Biotech Patent Debate*, 85 TEX. L. REV. 1677, 1679, 1685 (2007) (discussing data on biotech patents that suggest the lack of anticommons problems). See generally MICHAEL A. HELLER, *THE GRIDLOCK ECONOMY: HOW TOO MUCH OWNERSHIP WRECKS MARKETS, STOPS INNOVATION, AND COSTS LIVES* (2008).

physics, nanotechnology, and other areas of research and development become.³⁵³

These moral concerns are salient. Congress quickly reversed a judicial decision holding that using a patented invention to obtain approval for competitive pharmaceuticals infringes the exclusive rights of a patent.³⁵⁴ Under current experimental-use doctrine, however, there may be a gap in legislative protection of the drug development process, allowing a patent holder to block medical product research and development at the point between nonprohibited basic research and excepted medical-approval research.³⁵⁵ Further, recent court decisions have limited the patent-rights exception to patents on potentially approvable materials, rather than to all patented materials (particularly research tools), used in such research.³⁵⁶ Similarly, Congress reacted quickly to protect doctors and hospitals from being sued for infringement of medical and surgical method patents,³⁵⁷ even if it did not thereby protect patients or other medical service providers (who may act as the agents of doctors).³⁵⁸

Prudence, or responsibility, thus counsels against adopting dramatic changes to patent eligibility,³⁵⁹ given the high risks for innovation policy and the religious and moral concerns that would be triggered by changing the historic, strong protection for the public domain of science, nature, and ideas. Legislative action to further expand (rather than contract) the patent system seems unlikely for the present,³⁶⁰ even if the Supreme Court removes any constitutional restriction on such action,³⁶¹ and the Court appears willing to preserve the current limits as a matter of stare decisis.³⁶²

353. For the same reason, the experimental use exception should protect efforts to use disclosed knowledge not only to perform basic research on but also research with patented inventions, even where physical access to the patented invention (precluded making or use) is needed to do so. *See* Holzapfel & Sarnoff, *supra* note 270, at 165–66; *cf.* Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 Wis. L. Rev. 81, 86–88 (citing Embrex, Inc. v. Serv. Eng'g Corp., 216 F.3d 1343, 1343–49 (Fed. Cir. 2000)) (discussing concerns with prohibitions on using patented inventions in order to design around them).

354. *See* 35 U.S.C. § 271(e)(1) (2006); *Merck KGaA v. Integra LifeSciences I, Ltd.*, 545 U.S. 193, 205–08 (2005).

355. *See, e.g., Integra LifeSciences I, Ltd. v. Merck KGaA*, 331 F.3d 860, 877 (Fed. Cir. 2003) (Newman, J., dissenting); Brief of Amici Curiae Consumer Project on Technology, Electronic Frontier Foundation and Public Knowledge in Support of Petitioner at 2–3, 6–11, 20–30, *Merck KGaA v. Integra LifeSciences I, Ltd.*, 545 U.S. 193 (2005) (No. 03-1237).

356. *See Proveris Scientific Corp. v. Innovasystems, Inc.*, 536 F.3d 1256, 1262–64 (Fed. Cir. 2008).

357. *See* 35 U.S.C. § 287(c)(1) (2006).

358. *Cf.* Brief Amicus Curiae of AARP in Support of Petitioner at 9–10, *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124 (2006) (No. 04-607).

359. *See supra* note 61 and accompanying text.

360. *Cf. supra* note 57 and accompanying text.

361. *See supra* note 47 and accompanying text.

362. *See Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010).

A. REDUCED COSTS OF SEARCH AND BETTER EVALUATIONS AND DISCLOSURES

Given the requirement to treat new discoveries of science, nature, and ideas as if they were prior art, determining the eligibility of claims applying such discoveries should be simpler and more efficient than determining the patentability of these and other types of claimed inventions. This is because the required creativity and other inventive concept should—if the applicant has provided the required written description of the invention³⁶³—be apparent from the disclosure in the application’s specification. Thus, threshold elimination of claims for which the specification discloses an insufficiently creative invention or fails to disclose any sufficient one should avoid more detailed scrutiny. Facial evaluation of such insufficiency may avoid the need to search for prior art and to consider novelty under section 102, given the public-domain status of the discovery or other disclosed knowledge of its inherency. Similarly, it may avoid the need to consider obviousness under section 103 (including objective factual indicia thereof).³⁶⁴ Facial evaluation also may render moot any consideration of the sufficiency of the description to demonstrate “possession” of the invention under section 112, paragraph 1.³⁶⁵ Finding such claims ineligible also may avoid enablement-determination errors under section 112, paragraph 1, given that commensurability of claim scope may be unclear, but the initial burden of establishing a lack of enablement rests on the PTO.³⁶⁶

In contrast, if the disclosure fails to clarify whether the claim identifies a sufficiently creative application but the claim is *not* rejected outright for ineligibility or for lack of written description, additional system costs must be incurred. These include searches and evaluations to determine the point of novelty of the claimed invention as a whole,³⁶⁷ in light of known or newly discovered but ineligible science, nature, and ideas. In such cases, eligibility determinations should be simpler, and thus less costly and more accurate, than for most other patentability evaluations.³⁶⁸ This is because eligibility requires only identifying what

363. 35 U.S.C. § 112, ¶ 1 (2006).

364. *See, e.g.*, *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

365. *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (“[T]he specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed.”).

366. *See, e.g.*, *In re Wright*, 999 F.2d 1557, 1561–62 (Fed. Cir. 1993).

367. *See supra* note 44 and accompanying text.

368. In contrast, determinations that claims are indefinite under section 112, paragraph 2, may be simpler than determinations of eligibility, as the former require assessing only whether the scope of the claim is sufficiently intelligible to understand its limits without litigation to impose such limits, while the latter require assessing whether that scope corresponds to the claimant’s disclosed inventive contribution to the art. *See, e.g.*, Brief of Amici Curiae Consumers Union, et al. in Support of Defendants-Cross-Appellants at 4–9, *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc)

the inventions consist of and assessing them for minimal creativity of the relevant kind, whereas the existence of such an invention, and of its nature, is only a necessary, partial predicate for most other patentability determinations.³⁶⁹ These other determinations require additional, and, given resource constraints, at least equally suspect investigations and determinations, but the effort expended in evaluating threshold eligibility will not be wasted in making them.

For example, novelty decisions under section 102 require, in addition to identification of the inventive contribution beyond any ineligible new discovery, evaluation of the level of its publicity or use by the applicant or public access to comparable information invented by others.³⁷⁰ Both sets of information are needed to determine if the applicant should be considered the first person to provide the public with the specific contribution claimed.³⁷¹ Similarly, non-obviousness determinations under section 103 require, in addition to identification of the kind and degree of creative contribution, evaluation of the height of the inventive step under potentially more stringent requirements for creativity, while also balancing, in some unspecified fashion, objective historical and market indicia of non-obviousness,³⁷² as well as possibly measuring the usefulness of the contribution.³⁷³ These criteria and

(Nos. 03-1269, 03-1286).

369. See 35 U.S.C. § 101 (2006) (“Inventions patentable[:] Whoever invents or discovers any . . . subject to the conditions and requirements of this title.”); *id.* § 102 (“A person shall be entitled to a patent unless—(a) the invention . . . (b) the invention . . .”); *id.* § 103(a) (“A patent may not be obtained though the invention . . .”); *id.* § 112 ¶ 1 (“The specification shall contain a written description of the invention, and of the manner and process of using it . . .”).

370. See 35 U.S.C. §§ 102(a)–(g) (2006).

371. See, e.g., Margaret L. Begalle, *Eliminating the Totality of the Circumstances Test for the Public Use Bar Under Section 102(b) of the Patent Act*, 77 CHI.-KENT L. REV. 1359, 1359–61 (2002) (discussing factors historically affecting public use and on-sale determinations) (citing *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 67–68 (1998)); Note, *Novelty and Reduction to Practice: Patent Confusion*, 75 YALE L.J. 1194, 1194–96 (1966) (noting the “basic policy” of rewarding only the first inventor to “place the [knowledge] in the public domain” so that the knowledge is “made available to the public”). Of course, in most novelty determinations under section 102, that is, those other than applications of new discoveries of science, nature, and ideas, a substantial part of the applicant’s contribution to public knowledge will not be treated as prior art. But once the search for third-party art is performed and an assessment has been made that it is in the public domain (after considering evidence regarding the dates of invention and filing), the determination of the applicant’s creative contribution is comparable to the first step of the eligibility evaluation. Unlike for eligibility evaluation, however, under section 102 no assessment of sufficient creativity is needed. Rather, section 102 requires further assessment of whether (at the time of filing) that prior art was enabling of at least one embodiment of the claim. See, e.g., *Impax Labs., Inc. v. Aventis Pharm., Inc.*, 468 F.3d 1366, 1382–83 (Fed. Cir. 2006); Sean B. Seymore, *Rethinking Novelty in Patent Law*, 60 DUKE L.J. 919, 932–36 (2011).

372. See, e.g., *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416–27 (2007) (discussing different approaches to assessing obviousness); *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966) (discussing comparisons to prior art, evaluation of contribution, and objective indicia of non-obviousness); see also Sarnoff, *supra* note 320, at 1003–07, 1036–43 (discussing presumptions generally and the effects of the KSR decision on obviousness evaluations).

373. See, e.g., Risch, *New Uses for Patent Utility*, *supra* note 32, at 21 (“Usefulness is a potential

measures are not self-evident and also require search and complex evaluations. Written-description and enablement decisions under section 112 require evaluating the comparability of the identified creative contribution to the scope of exclusion that the claims would grant. To do so requires objectively assessing from the disclosure either subjective possession of the applicant of what has been identified as objectively claimed, or from the specification and from extrinsic evidence what a notionally skilled person would be capable of doing with the information under an uncertain standard of experimentation.³⁷⁴

Further, more rigorous application of categorical eligibility exclusions and clearer articulation of the required kinds and degrees of creativity may induce applicants to supply clearer specifications that better disclose the nature of their creative invention, so as to avoid rejection on either eligibility or written-description grounds. In turn, this may further reduce costs to the patent system, not only of making these determinations and other patentability evaluations but also by assisting better claim construction decisions. This would help to reduce the chilling effects on competition resulting from uncertain claim boundaries and to reduce the costs of reexamination and litigation (given clearer predictions and bases for judgment).³⁷⁵ Applying section 101 more firmly and clearly at the threshold thus not only may remove invalid claims more efficiently and effectively, but also may reduce overall costs and simultaneously improve the quality of the patents that ultimately issue from the system.

Significantly, the most common argument raised against the threshold application of eligibility criteria is overbreadth: that they are blunt instruments that will preclude the more precise, case-by-case evaluations under patentability criteria that would demonstrate that the claimed applications are patentable.³⁷⁶ But even if this concern were to have some force (for example, if eligibility decisions were based on innovation policies that categorically excluded particular areas of endeavor, rather than on policies that protect the public domain by requiring a minimal level of creative invention in the claimed application), the efficiency benefits of categorical exclusions might nevertheless outweigh the error costs of removing patentable claims

guide for determining whether an invention is a sufficient improvement on the prior art to be patentable.”).

374. *See supra* notes 332, 365.

375. *See, e.g.,* *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 236 (1942) (requiring claims to “clearly distinguish . . . what went before in the art” and warning against uncertainty that “would discourage invention only a little less than” clearly extended patent coverage). *See generally* JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* (2008).

376. *See supra* notes 16–20, 339 and accompanying text.

from the system.³⁷⁷ Further, this concern is fully addressed by the recognition of the proper relationship between eligibility and obviousness. Given prior-art treatment, any application that reflects insufficient creativity in the application of science, nature, and ideas *necessarily should be found obvious and should be unpatentable*. There thus should be *no* theoretical error costs of excluding claims at the threshold that should be patentable.

There should also be fewer practical error costs caused by relying on eligibility determinations, given that these determinations are conceptually simpler and that the prior-art status of new discoveries is supplied by the operation of law—when the applicant discloses it—rather than by potentially inadequate searching. Given clearer specification of the required creativity, it will be very difficult for applicants to game the system by hiding from their disclosures any new discoveries that underlie the applications they claim. To do so would likely raise questions regarding utility and enablement and might negatively impact desired claim scope.

B. REDUCED ADMINISTRATIVE BURDENS FROM FEWER (INEVITABLY UNPATENTABLE) APPLICATIONS

Relying on eligibility determinations should, in theory, discourage applications in excluded categories, reducing the overall volume of applications in the patent system and thereby conserving scarce examination resources. Similarly, clearer *ex ante* articulation of the degree and kind of creativity required for “invention” should discourage filing of insufficiently creative applications. Without such clarity, questionable applications will continue to be filed that will ultimately be found ineligible or unpatentable. Alternatively, they will issue as “bad patents,”³⁷⁸ based either on errors of examination or on doctrinal criteria that should be changed. There are two prominent recent examples that highlight both sets of concerns. The first is the PTO’s recent change to definiteness standards, which allow claims to be found invalid during prosecution when they are susceptible to alternative reasonable constructions, rather than when “insolubly ambiguous,” as had been the

377. Cf. Michael W. Carroll, *One for All: The Problem of Uniformity Cost in Intellectual Property Law*, 55 AM. U. L. REV. 845, 848–50 (2006) (discussing uniformity costs and the increasing need for tailoring approaches); Duffy, *supra* note 11, at 613 (noting the potential for doctrinal eligibility changes to exclude “whole fields of endeavor” while obviousness, enablement, and the doctrine of equivalents would recognize the “marginal quality” of such claims).

378. The definition of “bad patents” is ambiguous, alternatively reflecting beliefs that such patents should not properly have issued and beliefs that such patents properly issued but under insufficiently rigorous patentability criteria. See, e.g., Mark A. Lemley et al., *What to Do About Bad Patents*, REGULATION, Winter 2005–2006, at 10, 12 (noting that three-fourths of applications ultimately issue as patents and focusing on the difficulty of proving invalidity of issued patents); *id.* at 12 (discussing obtaining rights “broader than what they deserve” without explicit reference to validity).

prior standard in prosecution and remains the standard in infringement litigation.³⁷⁹ The second is the more rigorous non-obviousness doctrine resulting from a recent Supreme Court decision, rejecting the Federal Circuit's more rigid and applicant/patentee-favorable "teaching, suggestion, motivation" test.³⁸⁰

There are many potential private benefits to be obtained by applicants from erroneous patentability decisions or from uncertain validity,³⁸¹ which often may outweigh the costs of preparing and submitting applications. The benefits to the patent holder of acquiring invalid, questionable, or doctrinally bad patents should pose even broader social welfare concerns than the costs resulting from the lack of clarity over the uncertain scope of validly granted rights, which provide private benefits to patent holders by chilling sequential innovation and competition.³⁸² No meaningful sanctions exist to deter applicants from seeking and obtaining claims to which they ultimately are not found to be entitled. So long as they are not successfully sued—typically in the form of counterclaims—for fraud in obtaining such claims or for having affirmatively asserted claims that were known to be invalid,³⁸³ applicants will retain any pre-invalidation benefits without incurring any liability beyond the sunk costs of prosecution and maintenance. This is true even if they are found to have engaged only in inequitable conduct when obtaining the patents.³⁸⁴ Similarly, patent misuse is merely a defense, not a legal claim.³⁸⁵

Unless barred at the threshold, such erroneously granted claims will chill innovation more broadly than will claims of uncertain scope, due to their "unequivocal foreclosure of the field."³⁸⁶ Without clearer eligibility guidance, moreover, under the current conditions of inadequate or uncertain search and examination, the benefits to be obtained from such erroneously granted patents assure that they will continue to be filed. Presumably for this reason, among others, the Supreme Court in *Bilski*

379. See *Ex Parte Miyazaki*, No. 2007-3300, 2008 WL 5105055, at *4-6 (B.P.A.I. Nov. 19, 2008) (distinguishing *Exxon Research & Eng'g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001)).

380. See *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 407, 419-22 (2007) (rejecting the approach of, for example, *Al-Site Corp. v VSI Int'l, Inc.*, 174 F.3d 1308, 1323-24 (Fed. Cir. 1999)).

381. See generally Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75 (2005).

382. See, e.g., *supra* note 375 and accompanying text; see also *Lear, Inc. v. Adkins*, 395 U.S. 653, 668-75 (1969) (prohibiting licensee estoppel). *But cf.* *Carroll*, *supra* note 297, at 1425 (noting prosecution and enforcement costs that may render the expected value of patents too low to warrant investment in innovation or patenting).

383. See, e.g., *Walker Process Equip., Inc. v. Food Mach. & Chem. Corp.*, 382 U.S. 172, 174 (1965); *Handgards, Inc. v. Ethicon, Inc.*, 601 F.2d 986, 987-88 (9th Cir. 1979).

384. See, e.g., *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1285-87 (Fed. Cir. 2011).

385. See, e.g., *Ill. Tool Works Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 38 (2006).

386. *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 236 (1942).

invited the Federal Circuit to specify narrower categories or classes of abstract ideas—that is, clearer “rules,” although clearer “standards” would also be helpful³⁸⁷—that would provide the public with greater certainty of what can qualify as eligible and what cannot.³⁸⁸ This would in turn reduce applications for both ineligible and unpatentable claims, and preserve or expand claims that reflect greater creativity. It would therefore reduce administrative costs by wholly eliminating unnecessary eligibility and patentability evaluations, and by further reducing the costs of the eligibility and patentability determinations that remained, as the requisite creativity or lack thereof would be more transparent from the specification.

By providing greater clarity regarding the required kinds and degrees of creativity, the courts would also allow for better private ordering, which would result in better public decisionmaking and greater system efficiency. The greater clarity around the eligibility of such claims in turn might potentially reduce additional social costs associated with private decisionmaking and transactions.³⁸⁹

It is widely recognized that the existing patent system is overburdened with applications that should not be filed, resulting both in substantial processing delays and in grants that are erroneous because they are invalid; many such patents would not issue on either eligibility or patentability grounds if there were more and better use of search and examination resources.³⁹⁰ Given the increasing number of applications filed, and even with more resources being put into search and examination, the problems of delay and perhaps also of quality—in the sense of invalidly granted patents—are not improving.³⁹¹ These wrongly

387. See, e.g., Chisum, *supra* note 51, at 30 (criticizing the Court’s limited provision of a “clue” as an inadequate development of “tests or standards” appropriate “to resolve serious legal questions”); Lemley et al., *supra* note 12, at 1316 (“The [Bilski] result was a (narrow) victory for inventors, as well as for context-specific standards over formal rules.”). See generally Duffy, *supra* note 11.

388. See *Bilski v. Kappos*, 130 S. Ct. 3218, 3229 (2010).

389. See, e.g., Carroll, *supra* note 297, at 1429 (discussing the relationships between complexity, default property rules, and the administrative costs of licensing and litigation).

390. See, e.g., Matthew Sag & Kurt Rohde, *Patent Reform and Differential Impact*, 8 MINN. J. L. SCI. & TECH. 1, 16 (2007); see also Mark A. Lemley & Bhaven Sampat, *Examining Patent Examination*, 2010 STAN. TECH. L. REV. 2, 2–3; Warren K. Mabey, Jr., *Deconstructing the Patent Application Backlog*, 92 J. PAT. & TRADEMARK OFF. SOC’Y 208, 212–13 (2010). *But cf.* Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1497 (2001) (arguing that additional search and examination resources should not be spent on the large numbers of applications that result in patents that will never be developed into commercial applications or asserted against third parties); see also Sarnoff, *supra* note 320, at 1050–52. See generally John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185 (1998).

391. See, e.g., U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT: FISCAL YEAR 2009–2010 tbl.1–3 (2009) (reporting a thirty-seven percent increase in filings between 2003 and 2009); John Schmid, *Despite Efforts To Improve, U.S. Patent Approvals Move Slower*, MILWAUKEE-WIS. J. SENTINEL ONLINE, Jan. 16, 2011, <http://www.jsonline.com/watchdog/watchdogreports/113830084.html> (noting that even with faster processing to supply first office actions, pending

issued patents impose increasingly great social costs as reflected in the results of reexaminations,³⁹² which are exacerbated by the difficulty of invalidating such patents in litigation in light of the heightened burdens of proving invalidity.³⁹³

In sum, by applying categorical exclusions more consistently and by providing greater clarity regarding the required creativity in the application, fewer invalid applications should be filed and fewer invalid patents should issue. The patent system thus should be less burdened with the wasted costs of evaluating applications, or of having to reexamine or litigate granted patents that *should* have been rejected initially on eligibility or subsequently on patentability grounds. This will allow the limited administrative and judicial resources that exist to be directed to search and examination, and to reexamination and litigation, of claims that are closer to the margins of patentability. In turn, the patent system will issue improved quality patents, providing additional social benefits including reduction of the chills to innovation and competition that such improperly granted patents impose.

C. DIRECTION OF INVESTMENT, EFFORT, INVENTION, AND DISCLOSURE TOWARDS MORE CREATIVE APPLICATIONS

By consistently applying the section 101 categorical exclusions and more clearly articulating the requirement for creativity in the application, courts and the PTO will also set the bar higher for pre-filing development of inventors' understandings of the useful applications of newly discovered science, nature, and ideas. This is because applicants will likely undershoot the bar so long as the eligibility threshold remains unclear and the private incentives continue to favor seeking patents for insufficient creativity. Providing greater clarity thus should direct

applications exceed one million, and that number has not changed significantly in three years); *see also* DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT 22–30 (2009) (discussing the “patent flood,” “overburdened PTO,” continuations and reexaminations, and “patent holdup and litigation abuse”).

392. *See, e.g.*, U.S. PATENT & TRADEMARK OFFICE, QUARTERLY REVIEW: INTER PARTES REEXAMINATION FILING DATA REVIEW (2010) (reporting that ninety-two percent of patents litigated in inter partes reexamination proceedings are cancelled or amended); U.S. PATENT & TRADEMARK OFFICE, QUARTERLY REVIEW: EX PARTE REEXAMINATION FILING DATA REVIEW (2010) (reporting that between seventy-seven and eighty-eight percent of patents prosecuted in ex parte reexamination proceedings are cancelled or amended); *see also* ADAM B. JAFFE & JOSH LERNER, INNOVATION AND ITS DISCONTENTS 35–77 (2004) (discussing erroneously issued patents and their adverse effects on innovation).

393. *See, e.g.*, Brief Amici Curiae of 37 Law, Business, and Economics Professors in Support Petitioner at 1–6, 15–17, *Microsoft Corp. v. i4i Ltd. P'ship*, 131 S. Ct. 2238 (2011) (No. 10–290). *But cf.* Etan S. Chatlynnne, *Investigating Patent Law's Presumption of Validity—An Empirical Analysis*, 2010 PATENTLY-O PATENT L.J. 37, 43 (suggesting that the heightened evidentiary burden had relatively little impact on a narrow sample of validity challenges for obviousness in post-KSR cases). *See generally* Lemley & Shapiro, *supra* note 381; Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L. REV. 45 (2007).

investment, effort, invention, and disclosure towards more creative activities, just as a higher non-obviousness threshold induces researchers to address more difficult research topics.³⁹⁴ In turn, this should direct applicants towards more socially beneficial, less obvious or analogous, applications.³⁹⁵ It should also lead to more informative patent application disclosures, which in theory should lead to more rapid and cumulatively increased sequential innovation.³⁹⁶ As has been recognized in an international context, patent law's requirement for inventive activity sets a higher bar than do the corresponding levels of creativity required for utility model protection; jurisdictions lacking such utility model protections thus direct investment, effort, invention, and disclosures towards more creative activities and applications.³⁹⁷

Establishing a higher threshold for invention in the application, by clarifying creativity requirements, should also force discoverers of science, nature, and ideas to more fully develop their understanding before claiming in patent applications that they have made creative, patent-eligible, and patentable applications. It will thereby require a larger "quid" from the applicant, in terms of practical and beneficial applications, in exchange for the "quo" of exclusive rights to be obtained, the costs of which the public must pay. There is recent precedent in the patent system in both written-description and utility jurisprudence for setting a higher bar for the development of patentable applications of newly discovered scientific knowledge.³⁹⁸ Doing so in regard to subject matter should be no more problematic and simultaneously should provide the benefits, discussed above, that result from using eligibility as a threshold inquiry.

Establishing a higher threshold for invention in the application also should direct research and development towards activities most in need

394. See, e.g., Michael J. Meurer & Katherine J. Strandburg, *Patent Carrots and Sticks: A Model of Nonobviousness*, 12 LEWIS & CLARK L. REV. 547, 549, 551-57 (2008).

395. Cf. Lee, *supra* note 23, at 663 (arguing that patents that raise the costs of "normal" science may induce scientific paradigm shifts); Risch, *Reinventing Usefulness*, *supra* note 50, at 31 ("[P]ractical utility's commercialization effects are based on underlying assumptions about the value of disclosure, exclusive rights, and simultaneous competing efforts.").

396. See generally Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 J. ECON. PERSP. 29 (1991).

397. See, e.g., UMA SUMERANSEN, UTILITY MODELS AND INNOVATION IN DEVELOPING COUNTRIES xi, 16 (2006) (noting differences between patents and utility models, as well as the potential for the lower inventive threshold for utility models to "re-direct[] funds away from innovation or marketing" and to "cordon off areas of research").

398. See, e.g., *In re Fisher*, 421 F.3d 1365, 1378 (Fed. Cir. 2005) (setting a higher bar for utility); see also *Brenner v. Manson*, 383 U.S. 519, 534-35 (1966); cf. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1353 (Fed. Cir. 2010) (en banc) (same for written description). See generally Risch, *New Uses for Patent Utility*, *supra* note 32, at 13-17 (discussing the need to develop the practical utility of inventions, and the effect of timing of such developed understandings on races to the patent office and exploitation of patent prospects).

of patent protection,³⁹⁹ which may not necessarily include the most controversial areas of endeavor for patent-eligible subject-matter determinations—for example, business methods, software, genetic sequences, and, perhaps more debatably, medical diagnostics or treatments.⁴⁰⁰ Particularly since passage of the Bayh-Dole Act⁴⁰¹—which required universities and small businesses receiving federal funding and seeking title to inventions to subject their employees to assignment agreements⁴⁰²—it has been argued that the patent-system incentives are needed only for, and should apply only to, downstream product development rather than to upstream scientific and natural discoveries.⁴⁰³ And it bears noting that many forms of incentives and substantial public funding already exist for a great deal of basic research, although governmental contributions to research budgets have been decreasing relative to private funding.⁴⁰⁴

399. See, e.g., Carroll, *supra* note 297, at 1408–10 (discussing intuitions and evidence regarding the various types of innovation least in need of patent and copyright incentives); Carroll, *supra* note 297, at 1410–22 (discussing appropriability mechanisms other than patents for incentivizing investment and invention); see also Wesley M. Cohen et al., *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (Or Not)* 2 (Nat'l. Bureau of Econ. Research, Working Paper No. 7552, 2000), available at <http://www.nber.org/papers/w7552>.

400. See, e.g., *Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010); *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 862–63 (Fed. Cir. 2010); *Prometheus Labs., Inc. v. Mayo Collaborative Servs.*, 628 F.3d 1347, 1349–50 (Fed. Cir. 2010), cert. granted, 131 S. Ct. 3027 (2011); *Ass'n for Molecular Pathology v. USPTO*, 702 F. Supp. 2d 181, 184 (S.D.N.Y. 2010). Compare, e.g., *supra* notes 347, 352 and accompanying text, with Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255, 1278 (2009); Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 3 BROOKINGS PAPERS ON ECON. ACTIVITY (SPECIAL ISSUE) 783 (1987); James E. Bessen, *A Comment on "Do Patents Facilitate Financing in the Software Industry?"* (Bos. Univ. Sch. of Law, Working Paper No. 06-13, 2006); and Wesley M. Cohen et al., *supra* note 399.

401. Act of Dec. 12, 1980, Pub. L. No. 96-517, §§ 200–211, 94 Stat. 3015, 3019–3028 (1980) (codified as amended at 35 U.S.C. §§ 200–211 (2006)).

402. See *id.*; *Bd. of Tr. of the Leland Stanford Junior Univ. v. Roche Molecular Sys., Inc.*, 131 S. Ct. 2188, 2196–99 (2011).

403. See, e.g., Arti K. Rai, *Evolving Scientific Norms and Intellectual Property Rights: A Reply to Kieff*, 95 NW. U. L. REV. 707, 710 (2001) (“Significant transaction costs would be likely to arise if rights were granted in such upstream biological research as [expressed sequence tags] and single nucleotide polymorphisms (SNPs) of unknown function.”); Charles McManis & Suheol Noh, *The Impact of the Bayh-Dole Act on Genetic Research and Development: Evaluating the Arguments and Empirical Evidence* 1 (Wash. Univ. Sch. of Law, Working Paper No. 11-05-04, 2011), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1840639 (“At the heart of the debate are two interrelated questions—1) whether granting patents on the results of ‘upstream’ genetic research undermines the norms of the biological research community; and 2) whether such patenting promotes or retards biomedical innovation, technology transfer, and/or the development of downstream commercial products and processes.”). See generally Arti K. Rai & Rebecca S. Eisenberg, *Bayh-Dole Reform and the Progress of Biomedicine*, 66 L. & CONTEMP. PROBS. 289 (2003).

404. See, e.g., John Boswell & James R. Myers, *Automated Analysis of the Patent Landscape*, 21 ACCA DOCKET 72, 87 (2003) (“From 1994 to 2000, private industry increases in R&D funding fueled the largest real rise in history in U.S. expenditures on R&D.”); Patrick J. Clemins, *Historical Trends in Federal R&D*, in AAAS REPORT XXXIV: RESEARCH AND DEVELOPMENT FY 2010, at 25 (Am.

These concerns have repeatedly manifested themselves in the biotechnology context, raising serious concerns about upstream patents that discourage cumulative innovation and simultaneously raising serious concerns about changes to the normative belief structures and values that underlie the public domain treatment of science, nature, and ideas.⁴⁰⁵ But they exist also in regard to business methods and software, for which categorical exclusions would likely drive the patent system away from basic and upstream research, such as the development of algorithms with broad applications, and towards downstream product and process development.⁴⁰⁶

Given the prior-art treatment of the fruits of such basic research, changing the default rules for eligibility in the patent system may impose serious costs on sequential innovation and product development, as well as on public access to and the price of important technologies. For one of the most salient current examples, in the Myriad Genetics case, an international consortium was in the process of sequencing the breast cancer genome. The gene would have been placed into the public domain but for the efforts of Mark Skolnick, who employed access to Mormon genealogical records and Utah public health records and used federal funds and researcher assistance to more quickly locate the gene and then sequence it.⁴⁰⁷ But the location of the gene is clearly a natural phenomenon

Assoc. for the Advancement of Science 2010) (noting recent expenditures bringing research funding as compared to gross domestic product back to historic averages); Michael Yamaner, *Federal R&D Support Shows Little Change in FY 2008*, NAT'L SCI. FOUND. INFO BRIEF 09-320, Sept. 2009 tbl.1 (showing that federal R&D spending in year 2000 constant dollars has increased slightly since 1990, peaking in 2005); cf. Carroll, *supra* note 297, at 1368 (noting various alternatives for funding creativity, including "indirect subsidies through tax expenditure or market regulation through other tax policies, or direct spending on innovation either through direct employment or through a system of grants, rewards or prizes for creators and inventors").

405. Cf. Rebecca S. Eisenberg & Arti K. Rai, *Harnessing and Sharing the Benefits of State-Sponsored Research: Intellectual Property Rights and Data Sharing in California's Stem Cell Initiative*, 21 BERKELEY TECH. L.J. 1187, 1200 (2006) (discussing concerns over restrictions on data and materials transfers). But see, e.g., F. Scott Kieff, *Facilitating Scientific Research: Intellectual Property Rights and the Norms of Science—A Response to Rai and Eisenberg*, 95 NW. U. L. REV. 691 (2001). See generally Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663 (1996); Rebecca S. Eisenberg, *Proprietary Rights and the Norms of Science in Biotechnology Research*, 97 YALE L.J. 177 (1987); Arti K. Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NW. U. L. REV. 77 (1999); Rai, *supra* note 403.

406. See, e.g., BESSEN & MEURER, *supra* note 375, at 201 ("[T]he abstractness of software technology inherently makes it more difficult to place limits on abstract claims in software patents."); *id.* at 203 ("Patent law assumes that two technologies can be unambiguously determined to be equivalent or distinct Yet for software, this assumption simply does not hold. . . . Of course, not all software patents cover algorithms. Some are quite specific and limited in what they claim.").

407. See, e.g., Jordan Paradise, *European Opposition to Exclusive Control over Predictive Breast Cancer Testing and the Inherent Implications for U.S. Patent Law and Public Policy: A Case Study of the Myriad Genetics' BRCA Patent Controversy*, 59 FOOD & DRUG L.J. 133, 143-44 (2004); Bryn Williams-Jones, *History of a Gene Patent: Tracing the Development and Application of Commercial BRCA Testing*, 10 HEALTH L.J. 123, 131 (2002); Phyllida Brown & Kurt Kleiner, *Patent Row Splits*

(a medical fact), and once treated as prior art no creativity, particularly given the advanced state of genetic technologies, went into isolating the DNA for the gene or identifying its sequence.⁴⁰⁸ And even if it were treated it as an eligible invention, the prior-art status of the information about location and sequence should have made the claim obvious and unpatentable, just as the “lead compound” approach using routine methods to identify the gene’s function makes pharmaceutical claims obvious and unpatentable.⁴⁰⁹ As argued by various medical organizations and patient group amici, and as vigorously disputed by various biotechnology industry amici, these patents on the immensely important and publicly salient breast cancer gene should never have issued and debatably have resulted in large—and wholly avoidable—monetary, health, and innovation costs to the public.⁴¹⁰ Seeking to affirmatively authorize such patents by eliminating the categorical exclusions or their prior-art status would dramatically expand such controversies.

D. UTILITARIAN AND DEONTOLOGICAL RISKS OF CHANGING THE CURRENT APPROACH

The most significant argument against the categorical eligibility of such basic discoveries is the arguable overbreadth in regard to potentially discouraging investment and effort in discovering and disclosing science, nature, ideas, particularly given the lack of adequate governmental resources in tough economic times to fund basic research.⁴¹¹ But this

Breast Cancer Researchers, NEW SCIENTIST, Sept. 1994, at 4, 4.

408. Cf. *Parker v. Flook*, 437 U.S. 584, 595 (1978). (“If we assume that that method was also known, as we must under the reasoning in *Morse*, then respondent’s claim is, in effect, comparable to a claim that the formula 2Br can be usefully applied in determining the circumference of a wheel.”). See generally JOSEPH SAMBROOK & DAVID W. RUSSELL, *MOLECULAR CLONING: A LABORATORY MANUAL* (3d ed. 2001).

409. See, e.g., *Daichi Sankyo Co., Ltd. v. Matrix Labs., Ltd.*, 619 F.3d 1346, 1352–54 (Fed. Cir. 2010); *Altana Pharma AG v. Teva Pharms. USA, Inc.*, 566 F.3d 999, 1006–09 (Fed. Cir. 2009); *Eisai Co. Ltd. v. Dr. Reddy’s Labs., Ltd.*, 533 F.3d 1353, 1359 (Fed. Cir. 2008).

410. See *Ass’n for Molecular Pathology v. USPTO*, 702 F. Supp. 2d 181, 206–11 (S.D.N.Y. 2010) (reciting the competing allegations without finding the facts), *aff’d in part, rev’d in part*, 653 F.3d 1329 (Fed. Cir. 2011). Compare Brief for Amici Curiae Am. Med. Ass’n et al. in Support of Plaintiffs’ Opposition to Defendants’ Motion to Dismiss and in Support of Plaintiffs’ Motion for Summary Judgment at 22–24, *Ass’n for Molecular Pathology*, 702 F. Supp. 2d 181 (No. 09 Civ. 4515); Brief for Amici Curiae March of Dimes Found. et al. in Support of Plaintiffs at 17–25, *Ass’n for Molecular Pathology*, 702 F. Supp. 2d 181 (No. 09 Civ. 4515); and Brief for Am. Med. Ass’n et al. as Amici Curiae in Support of Plaintiffs-Appellees and Arguing for Affirmance at 2–12, *Ass’n for Molecular Pathology v. USPTO*, 653 F.3d 1329 (Fed. Cir. 2011) (No. 2010-1406), with Brief Amicus Curiae Biotech. Indus. Org. in Support of Defendants’ Opposition to Plaintiffs’ Motion for Summary Judgment at 18–27, *Ass’n for Molecular Pathology*, 702 F. Supp. 2d 181 (No. 09 Civ. 4515); Brief of Amicus Curiae Genetic Alliance in Opposition to Certain Positions of the Plaintiffs at 22–25, *Ass’n for Molecular Pathology*, 702 F. Supp. 2d 181 (No. 09 Civ. 4515); and Brief for Biotech. Indus. Org. and the Ass’n of Univ. Tech. Managers as Amici Curiae Supporting Reversal at 20–32, *Ass’n for Molecular Pathology*, 653 F.3d 1329 (No. 2010-1406).

411. See, e.g., Paul R. Michel, *Leading Citizens: Lead Congress so Congress Will Lead Your*

concern is addressed by the historical practice and underlying reasons for protecting and preserving the public domain of science, nature, and ideas free from patent rights, and thus for requiring sufficient creativity in their application.⁴¹² Society has made the decision that basic research and development—however paid for—should remain “free to all men and reserved exclusively to none,”⁴¹³ which is the common refrain in patent eligibility cases involving new discoveries.

Further, in the context of whether to grant private rights for publicly funded invention, the argument has been made that patents are most needed for downstream product development and not for upstream research and development.⁴¹⁴ Eliminating upstream restrictions on eligibility by eliminating the categorical exclusions and removing the requirement for eligibility in their application would raise even more strongly the anticommons, holdup, and related concerns for follow-on research and innovation, both basic and applied. Changing the current, default approach to the eligibility of categorically excluding science, nature, and ideas and of treating them as prior art is thus a very high-risk innovation-policy strategy. And it would likely cause even more serious changes to the scientific norms than those that have taken place since enactment of the Bayh-Dole Act.⁴¹⁵ As those norms change further, public resistance to treating discoveries as categorically excluded may also weaken.

Nevertheless, deontological moral norms against subjecting science, nature, and ideas to private, patent property rights remain strong, and proposing to eliminate the categorical exclusions or their prior-art status would generate controversies best avoided. These controversies are currently apparent in the political realm, where morality can more readily be discussed and legislated, in regard to the expansion of the patent system to new fields of endeavor such as cloned organisms and tax

Country, 20 FED. CIR. B.J. 265, 265–66 (2010) (“Increased public financing for increased investment in innovation, however, will be hard to find. Public finance has been nearly exhausted by the cost of two concurrent and continuing wars and a decade of fiscal mismanagement, saddling us with a huge annual debt payment and annual budget deficits of hundreds of billions of dollars. In this recession when tax revenues are down, obtaining even a modest increase in public research and development (‘R&D’) funding will be politically difficult, if not impossible. Actually, the challenge will be to avoid cuts in government R&D funding.”); *cf.* Lemley, et al., *supra* note 12, at 1326 (“The core mission of patent law is to create incentives for the production, disclosure, and commercialization of socially valuable inventions.”).

412. *See supra* notes 271–301 and accompanying text.

413. *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948).

414. *See supra* note 403 and accompanying text.

415. *See* Joshua D. Sarnoff & Christopher M. Holman, *Recent Developments Affecting the Enforcement, Procurement, and Licensing of Research Tool Patents*, 23 BERKELEY TECH. L.J. 1299, 1320–27 (2008) (discussing studies of changes to scientists’ research practices based on changes in the patent system); *supra* notes 403, 405 and accompanying text.

strategies.⁴¹⁶ In the case of extension of the patent system to medical and surgical methods of diagnosis and treatment, advocates for expansion won the eligibility battle but lost the rights war, at least in the United States, as Congress limited the scope of infringement liability to avoid subjecting medical practitioners and their institutions to the consequences of granting any such patents.⁴¹⁷

These normative disputes over extending the patent system will be even more polarizing when created by judicial decisions, particularly as there may be a one-way ratchet effect: Congress may not be able to retrospectively reverse the effects of the court decisions that extend eligibility without potentially generating takings liability,⁴¹⁸ which may further undermine the political ability of opponents of the court decision to obtain legislation that does so. In contrast, Congress can readily extend eligibility prospectively or retrospectively where the courts have restricted it, without creating a taking,⁴¹⁹ although some constitutional question remains regarding whether particular inventions that have entered the public domain as a result of the restriction can again receive protection.⁴²⁰ Given the long time frames for patents (though they are shorter than those for copyrights),⁴²¹ future beneficiaries of restoring earlier limits to eligibility are less likely to come forward to engage in the legislative or judicial arenas. In turn, this one-way ratchet effect of retrospective legislative repeal only of judicial restrictions tends to promote uncertainty and continuing expansion of the patent system rather than the stability of eligibility doctrine.⁴²²

416. See *supra* notes 56, 57 and accompanying text.

417. See 35 U.S.C. § 287(c) (2006). Lacking a sufficiently powerful and organized lobby, patients (that is, the entire general public) remain potentially liable. Most of the rest of the world simply excludes such claims from eligibility. See, e.g., Convention on the Grant of European Patents, *supra* note 198, at art. 53(c) (creating an exception to patentability that prohibits the grant of a patent, rather than creating an exclusion from the definition of invention). Nevertheless, patients themselves are not covered, and indirect liability may still give such patents force (and raise First Amendment free speech concerns). Cf. Brief Amicus Curiae of AARP in Support of Petitioner at 7–8, Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124 (2006) (No. 04-607); Dan L. Burk, *Patenting Speech*, 79 TEX. L. REV. 99, 115–17, 136–54 (2000).

418. See *supra* note 314 and accompanying text.

419. See *Stop the Beach Renourishment, Inc. v. Fla. Dep't. of Env'tl. Prot.*, 130 S. Ct. 2592, 2602–04 (2010) (discussing judicial takings).

420. See, e.g., *Golan v. Holder*, 609 F.3d 1076 (10th Cir. 2010), cert. granted, 131 S. Ct. 1600 (2011). Compare *Graham v. John Deere Co.*, 383 U.S. 1, 6 (1966) (“Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available.”), with *Eldred v. Ashcroft*, 537 U.S. 186, 203 (2002) (noting, in the context of extending the term of subsisting copyrights, that the validity of issued patents may depend on retrospective legislation, and citing *McClurg v. Kingsland*, 42 U.S. (1 How.) 202, 206 (1843), which had upheld the validity of a patent that was invalid under the law at the time of its grant but validated by subsequent legislation).

421. Compare 35 U.S.C. § 154(a)(2) (2006), with 17 U.S.C. § 302(a) (2006).

422. Cf. Duffy, *supra* note 11, at 613–14 (discussing the benefits of less clear but more durable approaches to eligibility, given the need for doctrinal stability over the two-decade time frame of

Finally, controversies over the morality of the patent system's application to controversial subject matter may tend to bring the patent system into disrepute, notwithstanding its less controversial benefits. This would detract from the ability to acquire sufficient government funds and adequately trained personnel to manage the many needs that already exist within the system. Thus, avoiding dramatic changes to eligibility doctrine should help to improve the patent system's function and to generate greater consensus over the benefits that it may provide. To the extent that proponents of expansion ultimately wish to be successful, they may be better off treading slowly and hoping that the normative shifts away from protecting the public domain will make the hoped-for transition more feasible and less controversial at some time in the future.

It may be impossible to demonstrate theoretically and empirically that the historical approach is a better innovation and moral policy than is limiting eligibility doctrine and permitting patents on uncreative, limited applications of newly discovered science, nature, and ideas—or than is congressionally or judicially legislating eligibility criteria out of existence. But the burden of proof is on advocates of change. As Fritz Machlup noted over fifty years ago, given that this approach has been our practice it would be irresponsible to propose changing it without more evidence to support the change, as much as if it had not been our practice it would be irresponsible to propose adopting it.⁴²³

CONCLUSION

The Supreme Court in *Bilski v. Kappos* has placed continued emphasis and required greater focus on patentable subject-matter eligibility,⁴²⁴ and we will continue to flounder unless and until a coherent theory is provided for why eligibility matters and what eligibility doctrine is really about. The Federal Circuit, in *Research Corporation Technologies*, and various scholars have articulated their reluctance to use patentable subject-matter eligibility doctrines to restrict access to the patent system.⁴²⁵ For the many reasons discussed above, this reluctance is unjustified so long as we continue to believe in a robust public domain of science, nature, and ideas and seek to protect it from encroachment by requiring additional and different creativity as the quid pro quo for entry into the patent system.

It is the more fundamental question of whether to have and to protect such a public domain at all, and the strong views that are held on that issue, that actually generate the heat surrounding the narrower, doctrinal, patentable subject-matter eligibility issues. Although

issued patents).

423. MACHLUP, *supra* note 61, at 80.

424. *See* 130 S. Ct. 3218 (2010).

425. *See* *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, (Fed. Cir. 2010); *supra* notes 11–15 and accompanying text.

theoretically ambiguous, our history and legal doctrine continue to reflect strong commitments to the public domain of science, nature, and ideas. In contrast, our current normative and political beliefs appear less certain and more polarized regarding whether to continue with these commitments.⁴²⁶ Given the long-standing and controversial history of private property encroachments on the commons,⁴²⁷ it should be no surprise that eligibility disputes are both contested and hot.

Restricting eligibility doctrine and lowering the creative threshold are correctly perceived as attacks on the public domain and to those historic beliefs. Wholly eliminating reliance on patentable subject-matter eligibility, moreover, would represent a scorched-earth strategy, particularly if combined with efforts to eliminate the prior-art treatment of science, nature, and ideas from patentability evaluations as well as from eligibility determinations.⁴²⁸ Conversely, to those who believe in using private property to motivate creative advance, using eligibility determinations to restrict access to the patent system is the bomb that threatens our future viability.⁴²⁹ For the reasons discussed above, I believe we need to learn to stop worrying and to love that bomb.⁴³⁰

426. See Kieff, *supra* note 405, at 695 (“[T]he breakdown in prescriptive norms that Rai attributes to patents in the post-1980 basic biological research community actually occurred well before 1980 as a result of several factors other than patents, which were largely unavailable in that community before 1980.”); *supra* note 426 and accompanying text.

427. See, e.g., James Boyle, *The Second Enclosure Movement and the Construction of the Public Domain*, 66 LAW & CONTEMP. PROBS. 33, 33–36 (2003) (discussing the historic enclosure of the public domain in land commons); *id.* at 40 (“Once again, the critics and proponents of enclosure are locked in battle, hurling at each other incommensurable claims about innovation, efficiency, traditional values, the boundaries of the market, the saving of lives, the loss of familiar liberties. Once again, opposition to enclosure is portrayed as economically illiterate . . .”). See generally JAMES BOYLE, *THE PUBLIC DOMAIN: ENCLOSING THE COMMONS OF THE MIND* (2008).

428. Cf. Boyle, *supra* note 427, at 52 (“Like the environment, the public domain must be ‘invented’ before it is saved.”).

429. Cf. Risch, *Everything Is Patentable*, *supra* note 14, at 658 (comparing eligibility exclusions to a “machete” that “eliminat[es] broad swaths of innovation,” while patentability criteria are a “scalpel”).

430. See DR. STRANGELOVE OR: HOW I LEARNED TO STOP WORRYING AND LOVE THE BOMB (Columbia Pictures 1964) (with apologies).
