

# ABOLISHING THE DOCTRINE OF EQUIVALENTS AND CLAIMING THE FUTURE AFTER *FESTO*

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## ABSTRACT

This Article argues that the Supreme Court or Congress should abolish patent law's modern doctrine of equivalents, articulated in *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*, 339 U.S. 605 (1950), and extended to later-arising technological equivalents in *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, 520 U.S. 17 (1997), and *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722 (2002). The modern doctrine of equivalents lacks theoretical justification, imposes high costs on society, and likely impedes innovation. It also needlessly conflicts with other patent law doctrines and complicates patent law procedures. These adverse effects are cumulatively imposed over time in regard to every issued and litigated patent for its entire term. The doctrine of equivalents should be restored to its historic form, limiting patent protection to the scope of application of the patent claims' construed language. As under the European Patent Convention, any residual fairness concerns would be addressed better by nonliterally interpreting claim language than by applying the modern doctrine of equivalents. The Supreme Court or Congress also may need to impose additional limits on the ability to claim later-arising technologies for patent law to serve its constitutional purpose of promoting progress.

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This Article is the third in a series of articles relating to the doctrine of equivalents. These articles seek to encourage and contextualize future discussions of abolishing the modern doctrine of equivalents. The first article, to be published in the *Federal Circuit Bar Journal*, describes conflicts among the modern doctrine and prosecution history estoppel and additional implied disclaimer and claim scope doctrines. It explains how the modern doctrine improperly extends patent protection to equivalents (including later-arising technologies) that could not validly be claimed. The second article, to be published in two parts in the *Journal of the Patent and Trademark Office Society*, discusses the historic doctrine of equivalents, the Supreme Court's radical reshaping of the doctrine in *Graver Tank*, and historic limits on claiming later-arising technologies. The second article explains how the modern doctrine of equivalents conflicts with the requirement for distinct claims adopted in the 1870 Patent Act, was adopted by the Supreme Court without statutory support, and was neither codified nor impliedly ratified by Congress in the 1952 Patent Act.

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## I. INTRODUCTION

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. The court is of opinion that the claim is too broad, and not warranted by law.<sup>1</sup>

A claim so broad, if allowed, would operate to enable the inventor who has discovered that a defined type of starch answers the required purpose to exclude others from all other types of starch and so foreclose efforts to discover other and better types. The patent monopoly would thus be extended beyond the discovery and would discourage rather than promote invention.<sup>2</sup>

[T]he limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others and the assurance that the subject of the patent will be dedicated ultimately to the public. Otherwise, a zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention only a little less than unequivocal foreclosure of the field, and the public would be deprived of rights supposed to belong to it, without being clearly told what it is that limits these rights.<sup>3</sup>

For centuries, patent law has sought to reconcile a fair scope of protection for inventors with certainty for the public regarding the limits of pat-

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1. O'Reilly v. Morse, 56 U.S. (15 How.) 62, 113 (1853).

2. Holland Furniture Co. v. Perkins Glue Co., 277 U.S. 245, 257 (1928).

3. Markman v. Westview Instruments, Inc., 517 U.S. 370, 390 (1996) (quoting Gen. Elec. Co. v. Wabash Appliance Corp., 304 U.S. 364, 369 (1938), United Carbon Co. v. Binney & Smith Co., 317 U.S. 228, 236 (1942), and Merrill v. Yeomans, 94 U.S. 568, 573 (1877)) (internal quotation marks, formatting, and citations omitted).

ent rights and the consequent scope of the public domain.<sup>4</sup> Protection must be commensurate with inventors' "just merits," but also must neither deprive the world of improvements nor retard the progress of the arts.<sup>5</sup> This conflict is inherent in the nature of invention. Individuals may invent or discover broad principles or specific applications of those principles. Accordingly, someone must decide the level of generality of the invention for which patent rights are sought and granted.<sup>6</sup> This inherent conflict is compounded by the evolutionary nature of technology and by ambiguities in language and its application. New applications may be discovered for known principles or creations. The meaning of language describing inventions also may change over time. The text of the patent must be interpreted in light of changing social contexts and increasing skill in the relevant technological fields.<sup>7</sup>

A patent's claims are supposed to define a patent's scope. Claims are formal, written descriptions that specify the scope of the invention for which patent protection is sought. The claims mark the boundaries of the invention to which intangible property rights attach, just as the written description of metes and bounds in a deed mark the boundaries of real property to which tangible property rights attach.<sup>8</sup> Under current law,<sup>9</sup> patent

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4. The public domain is the repository of knowledge that is already in the actual or constructive possession of the public; such knowledge cannot be newly disclosed to the public. *See, e.g.,* *Bartnicki v. Vopper*, 532 U.S. 514, 546 (2001) (Rehnquist, C.J., dissenting); J. THOMAS MCCARTHY, MCCARTHY ON TRADEMARKS AND UNFAIR COMPETITION § 1:30 (4th ed. 2002). *See generally* Symposium, *The Public Domain*, 66 LAW & CONTEMP. PROBS. 1 (2003).

5. *Sayre v. Moore*, 102 Eng. Rep. 139, 140 (1785) (Lord Mansfield, C.J.). *See generally* Donald S. Chisum, *The Scope of Protection for Patents After the Supreme Court's Warner-Jenkinson Decision: The Fair Protection-Certainty Conundrum*, 14 SANTA CLARA COMPUTER & HIGH TECH. L.J. 1 (1998).

6. *See, e.g.,* *Royal Typewriter Co. v. Remington Rand, Inc.*, 168 F.2d 691, 693 (2d Cir. 1948); *cf. Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930) (discussing "patterns of increasing generality" in copyright law). *See generally* Laurence H. Tribe & Michael C. Dorff, *Levels of Generality in the Definition of Rights*, 57 U. CHI. L. REV. 1057 (1990).

7. *See, e.g.,* Douglas Lichtman, *Rethinking Prosecution History Estoppel*, 71 U. CHI. L. REV. 151, 152 (2004); Craig A. Nard, *A Theory of Claim Interpretation*, 14 HARV. J.L. & TECH. 2, 7-9 (2000).

8. *See, e.g.,* *Cont'l Paper Bag Co. v. E. Paper Bag Co.*, 210 U.S. 405, 419 (1908) ("The invention, of course, must be described and the mode of putting it to practical use, but the claims measure the invention."); *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989) (discussing metes and bounds); *In re Vamco Mach. & Tool, Inc.*, 752 F.2d 1564, 1577 n.5 (Fed. Cir. 1985) (same).

9. At least some of the current standards are likely to change following en banc review by the Federal Circuit of numerous issues relating to claim construction

claims initially are construed by examiners in the U.S. Patent and Trademark Office (the “Patent Office”) according to the broadest reasonable interpretation consistent with the written description contained in the specification<sup>10</sup> that precedes the claims.<sup>11</sup> Claims subsequently are construed by judges (rather than by juries)<sup>12</sup> in light of the specification and of the prosecution history in the Patent Office.<sup>13</sup> Judges attempt to understand the document and its history as would a practitioner of ordinary skill in the relevant art, as of the effective application date for the claim.<sup>14</sup> Absent a judgment as a matter of law, juries determine whether the construed claims directly apply<sup>15</sup> to the allegedly infringing product or process.<sup>16</sup>

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methodologies. *See* Phillips v. AWH Corp., 376 F.3d 382 (Fed. Cir. 2004). The Supreme Court may further revise these standards, given the importance of the issues and their broad application.

10. *See* 35 U.S.C. § 112, ¶ 1 (2000). Requirements for patent specifications developed in the mid-18th century. *See, e.g.*, H. DUTTON, THE PATENT SYSTEM AND INVENTIVE ACTIVITY DURING THE INDUSTRIAL REVOLUTION, 1750-1852, at 75-76 (1984).

11. *See, e.g.*, Exxon Research & Eng’g Co. v. United States, 265 F.3d 1371, 1380 (Fed. Cir. 2001); *In re* Morris, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997); *In re* Zletz, 893 F.2d 319, 321-22 (Fed. Cir. 1989).

12. *See* Markman v. Westview Instruments, Inc., 517 U.S. 370, 379-80 (1996).

13. The process of applying for and obtaining a patent is called patent prosecution. The objective evidentiary record of the prosecution is now called the prosecution history, but was once called the file wrapper. *See, e.g.*, Autogiro Co. v. United States, 384 F.2d 391, 398 (Ct. Cl. 1967). *See generally* IRAH H. DONNER, PATENT PROSECUTION: PRACTICE AND PROCEDURE BEFORE THE U.S. PATENT OFFICE ch. 2 (BNA Books, 2d ed. 1999).

14. *See, e.g.*, Verve, L.L.C. v. Crane Cams, Inc., 311 F.3d 1116, 1119 (Fed. Cir. 2002); Schering Corp. v. Amgen Inc., 222 F.3d 1347, 1352-53 (Fed. Cir. 2000); Vitronics Corp. v. Conceptor, Inc., 90 F.3d 1576, 1583-84 (Fed. Cir. 1996).

15. I use the terms “directly apply” or “direct infringement,” rather than the more common “literally apply” or “literal infringement,” because claim construction may be nonliteral. However, “direct infringement” is often used to refer both to construction and application of claims and to infringement under the doctrine of equivalents. *See, e.g.*, Univ. of Houston Law Ctr., Inst. for Intellectual & Info. Law, *Decisions for 2002*, <http://www.patstats.org/2002.html> (last visited Dec. 19, 2004) [hereinafter *Decisions for 2002*] (categorizing infringement cases as “[l]iteral direct” and “[d]octrine of equivalents direct”). By literal construction, I refer to a meaning that existed at the relevant time, even though the meaning may have been an uncommon usage. By liberal construction, I refer to a broad, literal construction even though a narrower, literal construction could be applied. In contrast, by nonliteral construction, I refer to the creation of a new meaning for a disputed claim term that did not exist at the relevant time.

16. *See* Markman, 517 U.S. at 384 (citing Winans v. Denmead, 56 U.S. (15 How.) 330, 338 (1854)); *see also* Teleflex, Inc. v. Ficosa N. Am. Corp., 299 F.3d 1313, 1323 (Fed. Cir. 2002) (citing Johnson Worldwide Assocs. v. Zebco Corp., 175 F.3d 985, 988 (Fed. Cir. 1999)); *cf.* Sulzer Textil A.G. v. Picanol N.V., 358 F.3d 1356, 1366 (Fed. Cir.

Patents also provide patentees with exclusive rights under the modern doctrine of equivalents.<sup>17</sup> Under the modern doctrine, “a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is ‘equivalence’ between the elements of the accused product or process and the claimed elements of the patented invention.”<sup>18</sup> A doctrine of equivalents has existed since the beginning of American patent law, originating as a necessary comparison of the allegedly infringing product or process to the patented invention (before formal claim language was required).<sup>19</sup> For over a century after encouraging the use of formal claim language in 1822, in *Evans v. Eaton*,<sup>20</sup> the Supreme Court was careful to limit this historic doctrine of equivalents to the direct application of construed claim language.<sup>21</sup> In 1950, however, the Court in *Graver Tank & Manufacturing, Co. v. Linde Air Products Co.* radically revised the historic doctrine of equivalents by expanding patent protection beyond the scope of application of construed claim language to provide additional and, purportedly, fair protection.<sup>22</sup>

In two recent cases, *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*<sup>23</sup> and *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*,<sup>24</sup> the Supreme Court unanimously upheld the modern doctrine against various

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2004) (holding that juries must be instructed that they must follow the judge’s claim construction on disputed terms).

17. I use the term “modern” to emphasize the difference between the current doctrine and its historic predecessor of the same name. See *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950) (citing *Winans*, 56 U.S. (15 How.) 330, for “[o]riginating” the historic doctrine); Jay I. Alexander, *Cabining the Doctrine of Equivalents in Festo: A Historical Perspective on the Relationship Between the Doctrines of Equivalence and Prosecution History Estoppel*, 51 AM. U. L. REV. 553, 562 (2002) (citing *McCormick v. Talcott*, 61 U.S. (20 How.) 402, 405 (1857), for coining the term “doctrine of equivalents”).

18. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 21 (1997).

19. See, e.g., *Odiorne v. Winkley*, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432); *Reutgen v. Kanowrs*, 20 F. Cas. 555, 556 (C.C.D. Pa. 1804) (No. 11,710) (Washington, J.). See generally Harold C. Wegner, *Equitable Equivalents: Weighing the Equities to Determine Patent Infringement in Biotechnology and Other Emerging Technologies*, 18 RUTGERS COMPUTER & TECH. L.J. 1, 9-13 (1992) (citing additional cases).

20. 20 U.S. (7 Wheat.) 356, 433-34 (1822).

21. See Ronald D. Hantman, *Doctrine of Equivalents*, 70 J. PAT. & TRADEMARK OFF. SOC’Y 511, 533-35 (1988).

22. See 339 U.S. at 608-09. But see *id.* at 613 (Black, J., dissenting) (criticizing the purported fairness arguments). See generally Paul M. Janicke, *Heat of Passion: What Really Happened in Graver Tank*, 24 AIPLA Q.J. 1 (1996).

23. 520 U.S. 17 (1997).

24. 535 U.S. 722 (2002).

statutory challenges,<sup>25</sup> extended equivalents protection to later-arising technologies,<sup>26</sup> and imperfectly reconciled the modern doctrine with the doctrine of prosecution history estoppel for amended claims.<sup>27</sup> In this context, prosecution history estoppel “provides a legal limitation on the application of the doctrine of equivalents by excluding from the range of equivalents subject matter surrendered during prosecution of the application for the patent.”<sup>28</sup> In so holding, the Court departed from its historic standards for strictly construing statements and amendments made by the applicant during prosecution, and for determining whether such statements and amendments resulted in implied disclaimers of patentable subject matter.<sup>29</sup>

This Article discusses the lack of theoretical justification for the modern doctrine of equivalents, the social costs that it imposes, and the doc-

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25. Specifically, the Court rejected challenges based on inconsistency with the distinct claiming, Patent Office examination, and reexamination requirements, and on negative implication from legislative authorization in the 1952 Patent Act for means-plus-function claims that literally apply to “corresponding structure . . . and equivalents thereof.” 35 U.S.C. § 112 ¶ 6 (2000); *see Warner-Jenkinson*, 520 U.S. at 24-30 (discussing 35 U.S.C. §§ 112 ¶¶ 2, 6, and 251 ¶ 4); *id.* at 21, 25-26 (citing rejection of the same arguments made by the dissent in *Graver Tank*, 339 U.S. at 613-15 (Black, J., dissenting), and in *Winans v. Denmead*, 56 U.S. (15 How.) 330, 347 (1853) (Campbell, J., dissenting)); *id.* at 26-27 (noting that “pre-1952 precedent survived the passage of the 1952 Act”) (citing *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 342 (1961)); *see also Festo*, 535 U.S. at 726-27, 732-33 (2002) (citing *Warner-Jenkinson*).

26. *See Warner-Jenkinson*, 520 U.S. at 37; *cf. Festo*, 535 U.S. at 740 (discussing unforeseeable technology).

27. *See Festo*, 535 U.S. at 726-42; *Warner-Jenkinson*, 520 U.S. at 30-34.

28. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1460 (Fed. Cir. 1998) (en banc) (citation omitted). Prosecution history estoppel is not limited to the doctrine of equivalents, but applies generally to claim construction issues. *See Festo*, 535 U.S. at 733 (holding that prosecution history estoppel “is a ‘rule of patent construction’ that ensures that claims are interpreted by reference to those ‘that have been cancelled or rejected’”) (citation omitted); R. Polk Wagner, *Reconsidering Estoppel: Patent Administration and the Failure of Festo*, 151 U. PA. L. REV. 159, 162 n.8, 176-77 (2002) (noting the “universal” view that prosecution history estoppel is solely a limitation on the doctrine of equivalents, although it predates the modern doctrine and is “based on theories of disclaimer and reliance”).

29. *See, e.g., Exhibit Supply Co. v. Ace Patents Corp.*, 315 U.S. 126, 136-37 (1942) (By narrowing the claim language in an amendment, the patentee “recognized and emphasized the difference between the two phrases and proclaimed his abandonment of all that is embraced in that difference . . . . The difference which he thus disclaimed must be regarded as material, and since the amendment operates as a disclaimer of that difference it must be strictly construed against him.”) (citations omitted); *see also Johnson & Johnston Assocs. v. R.E. Serv. Co.*, 285 F.3d 1046, 1054-55 (Fed. Cir. 2002) (en banc) (holding that unclaimed disclosed equivalents are dedicated to the public).

trinal complexity that it creates. Part II of this Article illustrates how the modern doctrine expands and renders more uncertain over time the scope of patent protection. Part III criticizes the Supreme Court's arguments in support of the modern doctrine. Part IV describes the high costs imposed by the modern doctrine and questions the purported benefits that the modern doctrine is argued to provide. Part V explains how the modern doctrine conflicts with substantive standards and generates needless procedural complexity.

In conclusion, this Article argues that the doctrine of equivalents should be restored to its historic form, limiting patent protection to the scope of direct application of construed (and preferably literally interpreted) claim language. The modern doctrine of equivalents is not inevitable and conflicts with the European Patent Convention, which was recently held to limit patent protection to the scope of application of construed claims. Further, the Supreme Court or Congress may need to impose additional limits on claiming later-arising technologies in order to effectuate American patent law's constitutional purpose of promoting progress.<sup>30</sup>

This Article is the third in a series of articles relating to the doctrine of equivalents. These articles seek to encourage and contextualize future discussions of abolishing the modern doctrine of equivalents and of claiming later-arising technologies. The first article explains how the modern doctrine of equivalents operates, and describes how it conflicts with prosecution history estoppel and additional implied disclaimer and claim scope doctrines, in light of recent decisions of the Supreme Court and the United States Court of Appeals for the Federal Circuit (the Federal Circuit). In particular, the first article discusses how the modern doctrine improperly extends patent protection to later-arising equivalent technologies that the applicant could not validly have claimed.<sup>31</sup> The second, two-part article explains how the modern doctrine of equivalents: conflicts with the requirement for distinct claims adopted in the 1870 Patent Act; was adopted by the Supreme Court without statutory support in *Graver Tank*; and was neither codified nor impliedly ratified by Congress in the 1952 Patent

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30. U.S. CONST. art. I, § 8, cl. 8. I hope to address in subsequent articles whether the modern doctrine is unconstitutional, either as unauthorized federal judicial common law or as conflicting with express and implied limitations of the "Progress" clause from which the federal patent power derives. *Id.*

31. See Joshua D. Sarnoff, *The Doctrine of Equivalents and Claiming the Future After Festo*, 14 FED. CIR. B.J. (forthcoming 2004).

Act.<sup>32</sup> The courts as well as Congress thus may abolish the modern doctrine, notwithstanding the Supreme Court's recent statements that "if the doctrine is to be discarded, it is Congress and not the Court that should do so."<sup>33</sup> As discussed in this Article, there are good reasons for either to abolish the modern doctrine.

## II. THE MODERN DOCTRINE EXPANDS PATENT SCOPE AND RENDERS IT UNCERTAIN OVER TIME

### A. Current Standards for Applying the Modern Doctrine

Patent law's modern doctrine of equivalents dramatically and needlessly exacerbates the inherent conflicts over patent scope created in the interplay of generality, language, technology, time, and factual application.<sup>34</sup> The modern doctrine extends a patent's scope beyond the physical embodiments (or applications, whether or not enumerated in the specification)<sup>35</sup> of the construed language of a patent's claims. It extends the exclusionary patent law infringement right,<sup>36</sup> and contributory liability,<sup>37</sup> to additional products or processes that are considered to be factually equivalent to those embodiments. The modern doctrine thereby changes in-

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32. See Joshua D. Sarnoff, *The Historic and Modern Doctrines of Equivalents and Claiming the Future, Part I (1790-1870)*, J. PAT. & TRADEMARK OFF. SOC'Y (forthcoming), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=586122](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=586122) [hereinafter Sarnoff, *Historic and Modern DOEs, Part I*]; Joshua D. Sarnoff, *The Historic and Modern Doctrines of Equivalents and Claiming the Future, Part II (1870-1952)*, J. PAT. & TRADEMARK OFF. SOC'Y (forthcoming), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=586124](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=586124) [hereinafter Sarnoff, *Historic and Modern DOEs, Part II*].

33. *Festo*, 535 U.S. at 733 (citing *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 28 (1997)); cf. Paul M. Janicke, *When Patents Are Broadened Midstream: A Compromise Solution to Protect Competitors and Existing Users*, 66 U. CIN. L. REV. 7, 40 (1997) (noting that the 1952 Patent Act did not freeze the Court's ability to adopt intervening rights, in order to balance unfair applications of the doctrine of equivalents).

34. See *Festo*, 535 U.S. at 731 (describing inherent limitations on the ability of language to describe inventions) (citing *Autogiro Co. of Am. v. United States*, 384 F.2d 391, 397 (Ct. Cl. 1967)).

35. See *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 386 (1996) ("[T]he whole subject-matter of a patent is an embodied conception outside of the patent itself.") (citation omitted).

36. See 35 U.S.C. § 271(a) (2000); *Bauer & Cie. v. O'Donnell*, 229 U.S. 1, 10 (1913).

37. See 35 U.S.C. § 271(b)-(c). Such liability cannot be found without an actual infringement. See *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 341-42 (1961). See generally 5 DONALD S. CHISUM, CHISUM ON PATENTS §§ 17.02, 17.03 (2002) [hereinafter CHISUM ON PATENTS].

fringement from a question of identity—whether the product or process is an embodiment of the claimed category—to a less-constrained question of similarity.<sup>38</sup>

The Supreme Court has not imposed a standard for determining factual equivalency under the modern doctrine of equivalents. In *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, the Supreme Court refused to select (but did not discourage use of) any of the traditional formulations.<sup>39</sup> Instead, the Court posited the “essential inquiry” as one in which “the accused product or process contain[s] elements identical or equivalent to each claimed element of the patented invention.”<sup>40</sup> The Court thus restricted findings of equivalency only: (1) by requiring each limiting element of the claim<sup>41</sup> to be directly or equivalently present in an infringing

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38. See, e.g., *Johnson & Johnston Assocs. v. R.E. Serv. Co.*, 285 F.3d 1046, 1052 (Fed. Cir. 2002) (en banc) (holding that infringement is determined by comparing the accused product to the construed claims, not to preferred or commercial embodiments); Raj S. Davé, *A Mathematical Approach to Claim Elements and the Doctrine of Equivalents*, 16 HARV. J.L. & TECH. 507, 540 (2003) (noting the possibility of determining the similarity or difference of orders of elements in the claim and in accused products, and the difficulty or impossibility of determining substantial similarity when the orders differ). It is enough for present purposes to state that these judgments differ substantially in the degree of deference to historic linguistic practices and thus in the degree of interpretive discretion vested in the decision maker. 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 (Bobbs-Merill 1972)); cf. FERDINAND DE SAUSSURE, COURSE IN GENERAL LINGUISTICS 115 (Roy Harris trans., Open Court, La Salle, Ill. 1988) (1913) (Ideas are concepts “defined not positively, in terms of their content, but negatively by contrast with other items in the same system.”); WILLIAM JAMES, THE PRINCIPLES OF PSYCHOLOGY 459 (Dover Press 1950) (1890) (“This sense of Sameness is the very keel and backbone of our thinking.”).

39. See 520 U.S. 17, 39-40 (1977) (refusing to choose between “the so-called ‘triple identity’ test—focusing on the *function* served by a particular claim element, the *way* that element serves that function, and the *result* thus obtained by that element . . . [and the] ‘insubstantial differences’ approach.”) (emphasis added); *id.* at 35 (citing *Union Paper-Bag Mach. Co. v. Murphy*, 97 U.S. 120, 125 (1878), for the triple identity test); *id.* at 38-39, 39 n.8 (1977) (holding that absent judgment as a matter of law, equivalency is a jury question); see also *Genentech, Inc. v. Wellcome Found. Ltd.*, 29 F.3d 1555, 1567 (Fed. Cir. 1994) (applying triple identity test).

40. *Warner-Jenkinson*, 520 U.S. at 40.

41. Although claims are frequently described as having elements, it is preferable to refer to limitations of claims and to elements of inventions or embodiments. See, e.g., *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558, 564 n.1 (Fed. Cir. 2000) (en banc), *vacated on other grounds*, 535 U.S. 722 (2002). Whether specific language within a claim imposes a limitation poses another level of generality problem. See, e.g., JANICE M. MUELLER, AN INTRODUCTION TO PATENT LAW 242-43 (2003).

product or process, and therefore avoid “enlarg[ing] a patent beyond the scope of its claims”<sup>42</sup>; and (2) by instructing lower courts to determine as a matter of law whether a finding of equivalency in a particular case would “entirely vitiate a particular claim element.”<sup>43</sup> The Court thus specified the level of generality of invention (for determining infringement) at the level of the specific limitations of claim language (without articulating standards for determining what constitutes a limitation).

The *Warner-Jenkinson* Court also held that equivalency is determined at the time of infringement.<sup>44</sup> Thus, a product or process may be found equivalent if it includes a substituted technological element invented after the patented issued. This is true whether or not the later-arising technological substitute could reasonably have been contemplated by the inventor, as long as the substituted element does not entirely vitiate the claim limitation that it does not embody.<sup>45</sup>

### **B. Expansion of Patent Scope, Initially and Over Time**

Whatever equivalency standard is applied, the modern doctrine necessarily expands patent scope and renders it more uncertain than direct application of construed claim language. The modern doctrine adds to the scope of application of construed claims. Consider, as an example, a patent for “A chair, comprising: (a) a plastic base configured for sitting; and (b) a plastic back rest.” In direct infringement, the judge must construe the meaning of these terms for the jury, which must then determine whether the construed terms apply to the allegedly infringing product. Assume that the judge construes the “plastic back rest” so as to exclude direct application to a large plastic beanbag. Under the modern doctrine, the jury must determine whether the beanbag is substantially different from the claimed back rest, or whether it performs “substantially the same function [back support] in substantially the same way [structural pressure] to obtain sub-

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42. *Warner-Jenkinson*, 520 U.S. at 29 (citation omitted); see *Pennwalt Corp. v. Durand-Weyland, Inc.*, 833 F.2d 931, 935 (Fed. Cir. 1987) (en banc); cf. *Davé*, *supra* note 38, at 543-48 (discussing whether the Federal Circuit in *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251 (Fed. Cir. 1989), modified the strict one-to-one correspondence of elements required for finding equivalency in *Pennwalt*).

43. *Warner-Jenkinson*, 520 U.S. at 39 n.8; see also *id.* at 29 (Application of the doctrine must not “effectively eliminate that element in its entirety.”).

44. See *id.* at 37.

45. See, e.g., *SmithKline Beecham Corp. v. Excel Pharm., Inc.*, 356 F.3d 1357, 1364 (Fed. Cir. 2004) (describing unforeseeable, later-arising technologies that would not be claimable because they constitute “new matter” to be the “quintessential example of an enforceable equivalent” under the modern doctrine).

stantially the same result [providing a back rest].”<sup>46</sup> The jury may conclude that the uniformly constructed beanbag is an equivalent to the back rest and has a base.<sup>47</sup> The judge must then determine whether the jury’s finding of equivalency vitiates the meaning already given to the back rest limitation, which excluded the beanbag in the first instance. Although in this example the claim was construed narrowly, the modern doctrine provides protection for some unspecified range of equivalents beyond the claimed embodiments, regardless of how broadly or narrowly the claim is construed.

The modern doctrine also expands patent scope over time. When determining equivalency, juries apply current scientific understanding to the invention and the substituted technologies, rather than understanding in the art at the time the patent issued. Thus, a jury might find factual equivalency of the plastic beanbag to an earlier patent for “A chair, comprising: (a) a wooden base configured for sitting; and (b) a wooden back rest,” filed at a time when plastic had not been invented. The judge might construe “wood” as a limitation that does not include plastic, but the jury could properly find infringement under the modern doctrine so long as the substituted plastic performs substantially the same function in substantially the same way as its earlier wood counterparts. The judge might then conclude that the substitution of plastic for wood does not entirely vitiate the “wooden base” or the “wooden back rest” limitations of the claim. Under the modern doctrine, the patent would protect from infringement not just wooden chairs with bases and back rests, but all chairs of any form and materials later determined to be sufficiently similar.<sup>48</sup> This extended coverage defies the basic premises of patent law that inventions should receive protection only when disclosed, and that the disclosure of a broader scope of invention dedicates what is not claimed to the public.<sup>49</sup>

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46. *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929).

47. The same structural element can serve as an equivalent to more than one claim limitation, and multiple structural elements can be equivalent in function to a single claim limitation. *See, e.g., Eagle Comtronics, Inc. v. Arrow Communication Labs., Inc.*, 305 F.3d 1303, 1317 (Fed. Cir. 2002).

48. The patent may not even be limited to chairs. There is no “litmus test” for when the introductory words of a claim (in the preamble) impose structural limitations; the patent as a whole must be evaluated to determine what the inventor invented and intended to claim. *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989). The broader scope of the claim, however, would raise additional questions under the standards for patentability.

49. *See, e.g.,* 35 U.S.C. §§ 111-112 (2000) (stating procedural and substantive requirements for specifications that disclose and claim the invention); *Bonito Boats v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 149 (1989) (Patents are conditioned on the

### C. Avoiding Doctrinal Limits on Patent Claims

The only doctrinal limit currently imposed on the modern doctrine is that it must not vitiate the meaning of the claim elements. However, by extending protection beyond the claims' scope and by determining equivalency at the time of infringement, the modern doctrine may provide protection for equivalents—particularly for later-arising technological equivalents—that could not validly be claimed. As once recognized by the Federal Circuit,

a patentee should not be able to obtain, under the doctrine of equivalents, coverage which he could not lawfully have obtained from the PTO by literal claims. The doctrine of equivalents exists to prevent a fraud on a patent . . . not to give a patentee something which he could not lawfully have obtained from the [Patent Office] had he tried.<sup>50</sup>

The Federal Circuit has been concerned principally with preventing the modern doctrine of equivalents from eliminating prior art limits on the scope of claims.<sup>51</sup> However, the modern doctrine also should not protect

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choice of “either secrecy or legal monopoly.”) (quoting *Metallizing Eng'g. Co. v. Kenyon Bearing & Auto Parts Co.*, 153 F.2d 516, 520 (2d Cir. 1946)); *Miller v. Bridgeport Brass Co.*, 104 U.S. 350, 352 (1881) (Omission of apparent, disclosed subject matter from claims is dedicated to the public, because it constitutes “a declaration that that which is not claimed is either not the patentee’s invention or” is intended to be dedicated.); *Johnson & Johnston Assocs. v. R.E. Serv. Co.*, 285 F.3d 1046, 1054-55 (Fed. Cir. 2002) (en banc) (applying the doctrine of equivalents to unclaimed subject would “conflict with the primacy of the claims in defining the scope of the patentee’s exclusive right”) (quoting *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1424 (Fed. Cir. 1997)). See generally Edward C. Walterscheid, *The Early Evolution of the United States Patent Law: Antecedents (Part 3)*, 77 J. PAT. & TRADEMARK OFF. SOC'Y 771, 797 (1995) (“[T]he quid pro quo which the state receives for the patent grant is that enabling disclosure from which the public shall ultimately have the benefit.”); *id.* at 777-802 (1995) (stating that disclosure in a written specification became the required consideration for the grant of patent rights under English patent custom and developing common law prior to enactment of the U.S. Constitution); Edward C. Walterscheid, *The Early Evolution of the United States Patent Law: Antecedents (Part 4)*, 78 J. PAT. & TRADEMARK OFF. SOC'Y 77, 105-06 (1996) (The rationale ultimately adopted for the patent system was “to assure dissemination to the public of technical information which would otherwise be held in secrecy.”).

50. *Wilson Sporting Goods Co. v. David Geoffrey & Assocs.*, 904 F.2d 677, 684 (Fed. Cir. 1990).

51. See *id.* at 683-84 (encouraging use of hypothetical claims to prevent the doctrine of equivalents from applying to prior art inventions); see also *Talbert Fuel Sys. Patents Co. v. Unocal Corp.*, 347 F.3d 1355, 1359 (Fed. Cir. 2003) (citing *Pioneer Magnetics, Inc. v. Micro Linear Corp.*, 330 F.3d 1352, 1357 (Fed. Cir. 2003)). Although it is

equivalents that are either beyond the scope of the invention or—if treated as embodiments of claim language—would render the claims invalid under enablement, written description, or definiteness requirements.<sup>52</sup> In particular, later-arising equivalents that could not validly be claimed do not deserve protection, even if the lack of protection lessens the value of issued patents. Protecting such equivalents under the modern doctrine would evade these claim-language and claim-scope doctrines, which restrict patents to the scope of the applicant's invention, disclosure, and claims and which assure freedom to invent or compete over subject matter that was not invented, disclosed, or claimed by the patentee.

There are good and longstanding reasons to restrict patent protection to the scope of direct application of the construed language of definite claims. As Justice Story articulated in *Lowell v. Lewis*,<sup>53</sup> and as a unanimous Supreme Court later embraced in *Evans v. Eaton*:<sup>54</sup>

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recognized as a helpful tool, hypothetical claim construction is not required. *See, e.g.*, *Key Mfg. Group, Inc. v. Microdot, Inc.*, 925 F.2d 1444, 1449 (Fed. Cir. 1991).

52. *See* 35 U.S.C. §§ 102(f), 112 ¶¶ 1-2; *Univ. of Rochester v. G.D. Searle & Co., Inc.*, 358 F.3d 916, 919-30 (Fed. Cir. 2004) (finding that the written description imposes a limitation distinct from enablement to ensure 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); *In re Curtis*, 354 F.3d 1347, 1355 (Fed. Cir. 2004) (The disclosure must "clearly convey[] to one of skill in the art characteristics common to all species that explain how and why they make the invention operable.") (citing *In re Smythe*, 480 F.2d 1376, 1384 (C.C.P.A. 1973)); *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348-49 (Fed. Cir. 2002) (holding definiteness of claims and correspondence to the applicant's understanding are distinct requirements, determined from the perspective of skilled artisans); *Durel Corp. v. Osram Sylvania, Inc.*, 256 F.3d 1298, 1306 (Fed. Cir. 2001) (holding over-breadth for enablement is evaluated under the standard of "undue experimentation" at the time of filing); *In re Wands*, 858 F.2d 731, 740 (Fed. Cir. 1988) (discussing factors to consider when determining enablement). *See generally* Herbert J. Hammond, *The "Regards As His Invention" Requirement of Section 112, Paragraph 2 of the Patent Act: Ensuring That the Inventor Claims What He Regards As His Invention*, 5 TEX. INTELL. PROP. L.J. 257 (1997); Janet S. Hendrickson, *Solomon v. Kimberly-Clark Corp.: The Federal Circuit Throws Out the § 112, ¶ 2 "Regards" Clause with Inventor Litigation Testimony*, 32 U. TOL. L. REV. 407, 426-45 (2001) (discussing *Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1380 (Fed. Cir. 2000)). Section 102(f), which prohibits patents when the applicant "did not himself invent the subject matter sought to be patented," may impose similar limitations but has been under-theorized. 35 U.S.C. § 102(f).

53. 15 F. Cas. 1018 (C.C.D. Mass. 1817) (No. 8,568).

54. 20 U.S. (7 Wheat.) 356, 433-34 (1822) (describing the purposes of the written description requirement as, in part, to clarify for the public whether the patent "claims anything that is in common use, or is already known, and to guard against prejudice or injury" from unknowing infringement). *See generally* Karl Lutz, *Evolution of Claims of U.S. Patents (Part I)*, 20 J. PAT. & TRADEMAKR OFF. SOC'Y 134, 139-42 (1938)

[U]nless it be distinctly stated, in what that invention specifically consists, it is impossible to say, whether it ought to be patented or not; and it is equally difficult to know whether the public infringe upon or violate the exclusive right . . . . If, therefore, the description in the patent mixes up the old and the new, and does not distinctly ascertain for which, in particular, the patent is claimed, it must be void; since if it covers the whole, it covers too much, and if not intended to cover the whole, it is impossible for the court to say, what, in particular, is covered as a new invention.<sup>55</sup>

When recently allocating the task of claim construction to judges, the Court in *Markman v. Westview Instruments, Inc.*<sup>56</sup> reiterated these considerations, and added concerns about the potential for ambiguity of patent scope to discourage sequential innovation and beneficial competition.

[“Patents, whether basic or for improvements, must comply accurately and precisely with the statutory requirement as to claims of invention or discovery. T]he limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others, and the assurance that the subject of the patent will be dedicated ultimately to the public.”. . . Otherwise, a “zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention only a little less than unequivocal foreclosure of the field,” . . . and “[t]he public [would] be deprived of rights supposed to belong to it, without being clearly told what it is that limits these rights.”<sup>57</sup>

Patent law doctrines historically have limited the principles that could be claimed as inventions, precluding applicants from claiming their inventions at the highest levels of generality. These limits to overly-broad claims have changed over time, vary with the “pioneering” or “improvement” status of claimed inventions, and are currently in dispute.<sup>58</sup> Broad

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(discussing *Evans, Lowell, Isaacs v. Cooper*, 13 F. Cas. 153 (C.C.D. Pa. 1821) (No. 7,096) (Washington, J.), and other cases).

55. *Lowell*, 15 F.Cas. at 1020.

56. 517 U.S. 370 (1996).

57. *Id.* at 390 (quoting *Gen. Elec. Co. v. Wabash Appliance Corp.*, 304 U.S. 364, 369 (1938), *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 236 (1942), and *Merill v. Yeomans*, 94 U.S. 568, 573 (1877)) (citations omitted and preceding language from *General Electric Co.* added).

58. *Compare, e.g., O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 112-13 (1853) (prohibiting overly broad claims for principles that apply to “a manner and process” that was not described or invented by the patentee), and *Corning v. Burden*, 56 U.S. (15

patent claims can “block” later-arising technologies—including patentable improvements<sup>59</sup>—and thus may act as disincentives for sequential innovation.<sup>60</sup> As the Supreme Court stated in *Holland Furniture Co. v. Perkins Glue Co.*:<sup>61</sup>

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How.) 252, 268-69 (1853) (prohibiting claims for processes using functional “means” or “method” language), *with* *Morley Sewing-Mach. Co. v. Lancaster*, 129 U.S. 263, 273 (1889) (authorizing liberal interpretation and broad structural claims for pioneering inventions, which apply to later-arising substituted technologies), *and* *Dolbear v. Am. Bell Tel. Co.*, 126 U.S. 1, 532-39 (1888) (authorizing broad, functional claiming language for pioneering inventions and limiting the holding of *O’Reilly* by holding that patents are not confined to the means invented to apply the invented principle), *and* *Cochrane v. Deener*, 94 U.S. 780, 787 (1876) (authorizing patents for processes). The Federal Circuit continues to struggle with these issues. *Compare, e.g.*, *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1254-55 (Fed. Cir. 2004) (finding that claims construed to apply to later-arising technologies are invalid for lack of written description but not for lack of enablement), *and* *Plant Genetic Sys., N.V. v. DeKalb Genetics Corp.*, 315 F.3d 1335, 1340 (Fed. Cir. 2003) (distinguishing for claim validity known but “difficult to produce” technologies from “unknown concept[s]”), *with* *Chiron Corp.*, 363 F.3d at 1262-63 (Bryson, J., concurring) (stating that such claims also are invalid for lack of enablement, but should where possible be construed to avoid including later-arising technologies), *and* *Superguide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 878 (Fed. Cir. 2004) (finding that method and apparatus claims not in means-plus-function format may include later-arising technologies).

59. *See, e.g.*, *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 809-10 (Fed. Cir. 2002) (blocking patents are common for new, nonobvious uses of disclosed structural inventions); *Prima Tek II, L.L.C. v. A-Roo Co.*, 222 F.3d 1372, 1379 n.2 (Fed. Cir. 2000) (blocking patents are common for pioneering and improvement inventions). Statutory authority for broad claims that result in blocking patents derives from the 1793 Patent Act. *See* Act of February 21, 1793, ch. 11, § 2, 1 Stat. 317, 318; *Evans*, 20 U.S. (7 Wheat.) at 366. Although the express authorization for blocking was removed by the 1836 Patent Act, implied authorization was preserved in the definition of invention by expressly including improvements. *See* Act of July 4, 1836, ch. 357, § 6, 5 Stat. 117, 119 (currently codified at 35 U.S.C. § 101 (2000)). *See generally* 5 CHISUM ON PATENTS, *supra* note 37, § 16.02[1][a]; William R. Woodward, *Definiteness and Particularity in Patent Claims*, 46 MICH. L. REV. 755, 767-68 (1948).

60. *See* Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 861 n.96 (1990) (noting that “subservient” blocking patents are possible because the “dominant” patent’s disclosure is not inadequate by failing to describe with particularity the nonobvious embodiments to which the dominant patent’s claims apply); *see also* ROBERT P. MERGES & JOHN F. DUFFY, *PATENT LAW AND POLICY: CASES AND MATERIALS* 299-300 (3d ed. 2002) (discussing “Enablement and the Temporal Paradox”); T. Whitley Chandler, *Prosecution History Estoppel, the Doctrine of Equivalents, and the Scope of Patents*, 13 HARV. J.L. & TECH. 465, 496 (2000) (discussing the different time frames for determining obviousness of equivalents during prosecution and infringement); *cf.* *Roton Barrier, Inc. v. Stanley Works*, 79 F.3d 1112 (Fed. Cir. 1996) (Nies, J., additional views) (“A substitution in a patented invention cannot be both nonobvious and insubstantial.”). *See generally* Donald

A claim so broad, if allowed, would operate to enable the inventor who has discovered that a defined type of starch answers the required purpose to exclude others from all other types of starch and so foreclose efforts to discover other and better types. The patent monopoly would thus be extended beyond the discovery and would discourage rather than promote invention.<sup>62</sup>

By extending patent protection—limited only when claim elements would be vitiated—the modern doctrine of equivalents triggers all of these concerns.

### III. THE INADEQUATE JUSTIFICATIONS FOR THE MODERN DOCTRINE

In establishing and upholding the modern doctrine of equivalents, the Supreme Court has articulated several rationales for extending patent protection beyond the scope of direct application of construed claim language.<sup>63</sup> Each of these rationales is analyzed below. None of them withstand scrutiny in light of the earlier history of American patent law discussed below and the economic analyses discussed in Part IV.

#### A. *Graver Tank's* Rationales

The theoretical foundation for the modern doctrine of equivalents was articulated at the time of its creation in *Graver Tank*. In an earlier decision in the same action, the Supreme Court had invalidated broader composition claims that would have literally applied to the allegedly-infringing manganese fluxes at issue.<sup>64</sup> The Court apparently could not liberally construe the remaining composition claims (which included a limitation to alkaline earth metals) to apply to the manganese fluxes (as manganese is not an alkaline earth metal).<sup>65</sup> The Court likely strove to find infringement

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S. Chisum, *Anticipation, Enablement and Obviousness, An Eternal Golden Braid*, 15 AIPLA Q.J. 57 (1987).

61. 277 U.S. 245 (1928).

62. *Id.* at 257.

63. See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 731-32 (2002); *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 35-37 (1997); *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607 (1950).

64. See *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 336 U.S. 271, 276-77 (1949); Janicke, *supra* note 22, at 86-88.

65. See *Graver Tank*, 339 U.S. at 612. The Court had earlier preserved the validity of alkaline earth metal flux claims based on their exclusion of inoperative embodiments, and had refused to import limitations into other, broader composition claims in order to preserve their validity. See *Graver Tank*, 336 U.S. at 273-77. Further, claims that would have explicitly recited manganese fluxes would likely have been held invalid. See *Graver*

because of the importance of the invention<sup>66</sup> and because the patentee had not intended-in-fact to disclaim coverage when seeking and obtaining broader but invalid flux claims.<sup>67</sup> The Court thus extended patent protection beyond the scope of application of the literally construed language of the valid claims.

It is difficult to conceive of a case more appropriate for application of the doctrine of equivalents . . . . [T]he trial court could properly infer that the accused flux is the result of imitation rather than experimentation or invention. Though infringement was not literal, the changes which avoid literal infringement are colorable only.<sup>68</sup>

To reach its finding of infringement, the Court mischaracterized the history and nature of the doctrine of equivalents. The Court stated that the doctrine of equivalents: (1) had “evolved in response to th[e] experience” of “unscrupulous copy[ing]” and “piracy”; (2) had as its “essence . . . that one may not practice a fraud upon the patent”; (3) originated in *Winans v. Denmead*,<sup>69</sup> and had been consistently applied by the Court and lower courts; and (4) was available “[t]o temper unsparing logic and prevent an infringer from stealing the benefit of the invention.”<sup>70</sup> In fact, the doctrine: (1) had evolved as a necessary construct for determining the scope of patent protection before and after requiring use of formal claims; (2) had, as its essence, a required judicial judgment on the level of generality of the patented principle of invention and, after claims were required, the level of generality that permissibly had been claimed; (3) originated before *Winans*, which had reinforced that the doctrine was limited to the scope of application of construed claims; and (4) was available only within the scope of application of construed claims in order to assure notice to the public and to prevent fraud on the Patent Office, requiring the patentee to

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*Tank*, 339 U.S. at 618 (Douglas, J., dissenting) (noting that a claim to the manganese flux composition could not have been patented because it was already disclosed in a prior art patent); Janicke, *supra* note 22, at 121 n.444 (discussing invalidity of the alkaline earth metal claim were it to apply directly to the manganese flux).

66. See Janicke, *supra* note 22, at 69-74 (discussing the nature of the invention, its commercial success, and its importance to the Allied war effort during World War II).

67. See *Johnson & Johnston Assocs. v. R.E. Service Co.*, 285 F.3d 1046, 1060-63 (Fed. Cir. 2002) (en banc) (Dyk, J., concurring) (arguing that dedication—or disclaimer—should be a form of conscious waiver of patent rights and that the absence of such a conscious waiver was the basis for the holding in *Graver Tank*).

68. *Graver Tank*, 339 U.S. at 612.

69. 56 U.S. (15 How.) 330 (1853).

70. *Graver Tank*, 339 U.S. at 607-08 (quoting *Royal Typewriter Co. v. Remington Rand, Inc.*, 168 F.2d 691, 692 (2d Cir. 1948)).

timely seek a reissued patent to protect any disclosed scope of the patentable invention that had not validly been claimed.<sup>71</sup>

The Supreme Court articulated three separate justifications for revising the doctrine of equivalents and extending protection beyond the scope of application of the claim limitations selected by the patentee and relied on by the public. First, the Court argued that extra-claim protection was needed to assure fairness to patentees and to protect the monetary value of patents from inevitable copying of principles of invention that are not fully encompassed by claim language. The Court stated:

[T]o permit imitation of a patented invention which does not copy every literal detail would be to convert the protection of the patent grant into a hollow and useless thing. Such a limitation would leave room for—indeed encourage—the unscrupulous copyist to make unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the claim, and hence outside the reach of law. One who seeks to pirate an invention, like one who seeks to pirate a copyrighted book or play, may be expected to introduce minor variations to conceal and shelter the piracy.<sup>72</sup>

Second, the Supreme Court criticized linguistic formalism. “To prohibit no other would place the inventor at the mercy of verbalism and would be subordinating substance to form.”<sup>73</sup> The Court thus implicitly suggested that limits exist in the ability of language to fully describe and thus to disclose and claim an invented principle. Third, the Court argued that limiting protection to claim language would discourage inventors from disclosing their inventions, stating “[i]t would deprive him of the benefit of his invention and would foster concealment rather than disclosure of inventions, which is one of the primary purposes of the patent system.”<sup>74</sup>

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71. See Darcy A. Paul, *The Judicial Doctrine of Equivalents*, 17 HARV. J.L. & TECH. 247, 254-61 (2003) (challenging that *Winans* originated the doctrine of equivalents and relating the doctrine to the development of claiming practices); Sarnoff, *Historic and Modern DOEs, Part I*, *supra* note 32, *passim*; Sarnoff, *Historic and Modern DOEs, Part II*, *supra* note 32, *passim*; cf. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 34 (1997) (“[Although] *Graver Tank* refers to the prevention of copying and piracy when describing the benefits of the doctrine of equivalents[, t]hat the doctrine produces such benefits, however, does not mean that its application is limited only to cases where those particular benefits are obtained.”).

72. *Graver Tank*, 339 U.S. at 607.

73. *Id.*

74. *Id.*

These rationales clearly overlap. If claim language were able to fully describe inventions, additional protection would not be required for fairness nor needed to prevent copying. If fairness were assured and copying were prohibited by claim language, additional protection would not be needed to induce—and might not induce any—additional disclosure.

### 1. *Fairness and Copying*

Without a doctrine of equivalents, patentees may be deprived of some protection for their inventions that even a liberal claim construction would afford. This would leave the public and competitors free to copy some portion of the invented subject matter and to use it without paying the patentee for the privilege of doing so.<sup>75</sup> But some additional, extrinsic standard of fairness is required to establish that any limits to the scope of application of patent claims is unfair and that any such copying is a fraud on a patent.<sup>76</sup> For the public, the additional protection may constitute an unwarranted restriction of the public domain; for the patentee, the additional protection may provide an unjust enrichment.

Absent an external criterion to delimit the scope of an inventor's rights, the Supreme Court's fairness and copying rationales may reflect only judicial hostility to competition or to "designing around" patent claims.<sup>77</sup> Accordingly, the Federal Circuit and some commentators have suggested that the modern doctrine of equivalents is an equitable doctrine, requiring more explicit consideration of extrinsic fairness criteria.<sup>78</sup> Al-

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75. *See, e.g., Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558, 619 (Fed. Cir. 2000) (en banc) (Rader, J., concurring-in-part and dissenting-in-part) ("Without a doctrine of equivalents, any claim drafted in current technological terms could be easily circumvented after the advent of an advance in technology.").

76. *Cf. Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 911 (Fed. Cir. 2004) ("[T]he court has 'admonished against judicial rewriting of claims to preserve validity.'") (quoting *Rhine v. Casio, Inc.*, 183 F.3d 1342, 1345 (Fed. Cir. 1999)).

77. *See* Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 999 n.47 (1997) (noting recent changes in judicial solicitude for designing around patent claims). *See generally* Edmund W. Kitch, *Property Rights in Inventions, Writings, and Marks*, 13 HARV. J.L. & PUB. POL'Y 119, 122-23 (1990) (discussing designing around and the relation of patent rights to market value and power).

78. *See, e.g., Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1540 (Fed. Cir. 1995) (en banc) (Plager, J., dissenting) (describing the modern doctrine as a "judge-made exception to these statutory mandates," authorized within limits by "extraordinary [judicial] equity power" "to deviate from the strict requirements of the law," and arguing that judges should be provided with broad equitable discretion to reform patent scope); *Pennwalt Corp. v. Durand-Weyland, Inc.*, 833 F.2d 931, 935 (Fed. Cir. 1987) (en banc) (citing cases); Wegner, *supra* note 19, at 5 (Placing a "burden of establishing an equitable need for application of the doctrine of equivalents" would encourage "legitimate competition outside the boundaries of a patent claim.").

though the Supreme Court used fairness-based language in *Graver Tank*, the Court eschewed an intent standard in *Warner-Jenkinson*.<sup>79</sup>

Limiting a patent to direct applications of the construed language of its claims may be thought to be unfair for at least three reasons. First, claim language and claim validity doctrines might unfairly exclude from claims some existing and future embodiments of the invention—notwithstanding the broad scope of claims currently allowed for pioneering inventions and the ability of patentees to use generic or functional language to claim unforeseeable (and block nonobvious) later-arising improvements of the invented principle.<sup>80</sup> Second, unfairness might result from legal limits to—or practical difficulties and costs associated with—more specifically claiming embodiments of the invented principle.<sup>81</sup> Third, unfairness might

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79. See 520 U.S. 17, 35 (1997); see also *id.* at 36 (“At a minimum, one wonders how ever to distinguish between the intentional copyist making minor changes to lower the risk of legal action and the incremental innovator designing around the claims, yet seeking to capture as much as is permissible of the patented advance.”).

80. See, e.g., *Noelle v. Lederman*, 355 F.3d 1343, 1348-50 (Fed. Cir. 2004) (Patentable subject matter is disclosed to the extent that it was identifiable to skilled practitioners at the time of filing, considering predictability in the art at that time.) (citing *Enzo Biochem v. Gen-Probe, Inc.*, 323 F.3d 956, 965 (Fed. Cir. 2002), and *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991)); *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1344 (Fed. Cir. 2001) (Patentee need not disclose all future embodiments.); *Utter v. Hiraga*, 845 F.2d 993, 998 (Fed. Cir. 1988) (Written description need not describe “all species that [the] claim encompasses.”); *supra* note 58 and accompanying text; cf. *Glaxo Wellcome, Inc. v. Impax Labs., Inc.*, 356 F.3d 1348, 1354-55 (Fed. Cir. 2004) (holding that patentees must claim “readily known equivalents” at the time of application and cannot claim protection under the doctrine of equivalents based on failure to disclose such equivalents); *Ranbaxy Pharms., Inc. v. Apotex, Inc.*, 350 F.3d 1235, 1241 (Fed. Cir. 2003) (Known similar properties of chemical substitutes making them equivalent would also make claiming them foreseeable.). See generally Christopher A. Cotropia, “*After-Arising Technologies and Tailoring Patent Scope*,” 61 NYU ANN. SURV. OF AM. L., at 9-13 (forthcoming 2005), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=617441](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=617441) (last visited Dec. 19, 2004) (discussing recent cases finding temporal limits to claiming later-arising embodiments).

81. See, e.g., 35 U.S.C. § 132(a) (2000); *SmithKline Beecham Corp. v. Excel Pharms., Inc.*, 356 F.3d 1357, 1364 (Fed. Cir. 2004) (noting that later-arising technology, “would always be unclaimable new matter,” and thus the doctrine of equivalents “compensates for the patentee’s inability to claim unforeseeable new matter”); *Milcor Steel Co. v. George A. Fuller Co.*, 316 U.S. 143, 145-46, 146 n.3 (1942) (holding that disclaimers cannot add new matter and thereby claim narrower, previously unclaimed combinations, because “it is these claims, not the specifications, that afford the measure of the grant to the patentee”); cf. *Schering Corp. v. Amgen, Inc.*, 222 F.3d 1347, 1352 (Fed. Cir. 2000) (noting the relation of the new matter prohibition to “the adequate disclosure requirements of 35 U.S.C. § 112”) (citing *Pennwalt Corp. v. Akzona Inc.*, 740 F.2d 1573, 1578 (Fed. Cir. 1984)). See generally Joseph S. Cianfrani, *An Economic Analysis of the Doctrine of Equivalents*, 1 VA. J.L. & TECH. 1, 41-44 (1997) (treating the

result from holding patentees to any “mistakes” that they made in the language of the claims actually adopted. The Supreme Court in *Graver Tank* did not identify which, if any, of these three fairness criteria it applied when referring to copying of unclaimed or invalidly claimed subject matter as piracy and fraud. But whatever the Court intended, each of these criteria would have conflicted with established patent law principles. For this reason, the United States, in 1970, argued as an amicus curiae that the doctrine of equivalents articulated in *Graver Tank* “contradict[s] fundamental principles of the statutory patent system” and that the rights of patentees would be adequately protected without the doctrine, by permitting inventions to be comprehensively claimed using functional or generic claiming language and by allowing reissued patents for claiming mistakes.<sup>82</sup>

a) Limits to Broad Claims

It is fundamental to American patent law that patentees are not entitled to protection for what they either did not invent or did not disclose to the public. Since 1853, the Supreme Court has repeatedly held that patentees cannot claim principles at a level of generality that would apply beyond what was actually invented and disclosed. Such claims would too broadly block sequential invention.<sup>83</sup> Under the utilitarian philosophy that supposedly animates American patent law,<sup>84</sup> unfairness (in this context under-

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doctrine of equivalents as a method of protecting inventions that avoids inefficient expenditures on literal claim drafting and negotiation, because patentees will increase the breadth of patents only “up to the point where the marginal benefits equal the marginal costs of further prosecution”); Michael J. Meurer & Craig A. Nard, *Invention, Refinement and Patent Claim Scope: A New Perspective on the Doctrine of Equivalents*, at 8, 33-42 (Apr. 20, 2004) (arguing that application of the doctrine of equivalents “to later-developed technology can be justified only as a means of discouraging excessive investment in refinement” of claim language), at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=533083](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=533083).

82. Brief for United States as Amicus Curiae at 13, 19-21, *Standard Indus., Inc. v. Tigrett Indus., Inc.*, 397 U.S. 586 (1970) (No. 445) [hereinafter U.S. Amicus Brief]; cf. *Miller v. Bridgeport Brass Co.*, 104 U.S. 350, 352 (1881) (limiting broadening reissues to “a clear mistake, or inadvertence, and a speedy application for its correction”).

83. See *supra* notes 53-62 and accompanying text. See generally Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 J. ECON. PERSP. 29 (1991); James Bessen & Eric Maskin, *Sequential Innovation, Patents, and Imitation* (July 2002), available at <http://www.sss.ias.edu/papers/econpaper25.pdf>.

84. See, e.g., U.S. Amicus Brief, *supra* note 82, at 13-14 (“The public interest, and not private reward, is the dominant factor to be considered in adjusting conflicts over the scope of patent monopolies.”) (citing *Graham v. John Deere Co.*, 383 U.S. 1 (1966)); Yochai Benkler, *Siren Songs and Amish Children: Autonomy, Information, and Law*, 76 N.Y.U. L. REV. 23, 59 (2001) (arguing that the “basic ideological commitment” of

stood as inefficiency) could result only from doctrines that *improperly* prevent claiming the full scope of what was actually invented and disclosed. Unfairness cannot be presumed from the mere fact that the doctrine limits protection. Demonstrating unfairness thus requires a showing of mistaken judgments regarding the social welfare effects of these doctrines, including but not limited to effects on pioneering and sequential invention. The Court in *Graver Tank* did not offer any such showing, although it suggested that strict adherence to these doctrines would discourage disclosure of inventions.

Further, merely showing that claim-language and claim-scope doctrines improperly limited the scope of invented and disclosed principles would not suffice to validate the modern doctrine of equivalents. Instead, it would be necessary to demonstrate that these doctrines *could not* be revised to authorize a proper scope of protection. If correction were possible, doctrinal reform would presumably be the preferable solution. In the continued presence of imperfect claim-language and claim-scope doctrines, the modern doctrine would provide a “second-best” solution that might work at cross-purposes with these doctrines.<sup>85</sup>

#### b) Limits to and Costs of Specific Claims

The Supreme Court has required patentees to clearly define the scope of the subject matter sought to be protected since 1822, a requirement codified by Congress in 1836.<sup>86</sup> Failure to claim disclosed subject matter results in dedication of the unclaimed scope to the public, absent a timely application for a reissued patent, subject to so-called intervening rights.<sup>87</sup>

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American intellectual property laws is utilitarian, and neither based on Lockean rights nor Hegelian personality theories). *But cf.* Edward C. Walterscheid, *Patents and Manufacturing in the Early Republic*, 80 J. PAT. & TRADEMARK OFF. SOC'Y 855, 856 (1998) (noting that beliefs that the patent system “was intended primarily for the benefit of inventors as opposed to that of the general public” persisted until the nineteenth century). Under deontological theories, moreover, unfairness to patentees (if any) would need to be balanced against unfairness to the public resulting from lack of notice.

85. See Richard Lipsey & Kelvin Lancaster, *The General Theory of the Second Best*, 24 REV. ECON. STUD. 11-32 (1956-57) (discussing how, in the presence of market imperfections preventing optimal equilibrium conditions, corrective strategies may have unpredictable social welfare effects).

86. See 35 U.S.C. § 112 ¶ 2 (2000) (distinct claiming requirement); *Evans v. Eaton*, 20 U.S. (7 Wheat.) 356, 433-37 (1822). See generally Sarnoff, *Historic and Modern DOEs, Part I, supra* note 32, *passim*.

87. See 35 U.S.C. §§ 251, 252 ¶ 2; *Shepard v. Carrigan*, 116 U.S. 593, 598 (1886); *Mahn v. Harwood*, 112 U.S. 354, 360-61 (1884); *Goodyear Dental Vulcanite Co. v. Davis*, 102 U.S. 222, 228 (1880); *Leggett v. Avery*, 101 U.S. 256, 259-60 (1879).

This is true without regard to the difficulty or the costs to the patentee of drafting more expansive or more specific claims.

Further, a patentee's failure to disclose and claim a more specific application of an invented principle precludes the later disclosure and priority claiming of "new matter."<sup>88</sup> Courts also are prohibited by the patentee's choice of unambiguous language from construing claims narrowly to preserve their validity (by importing limitations disclosed in the specification) or broadly to avoid an implied disclaimer (by removing limitations from the claim).<sup>89</sup> The failure to protect a more specific but unclaimed application of a disclosed invention thus should not be considered unfair. The patentee either has failed to adequately disclose the invention or has done so and failed to validly claim it. Either way, the patentee does not deserve to receive the additional protection that was not properly sought.

As the Court stated in *Merill v. Yeomans*<sup>90</sup> almost three-quarters of a century before *Graver Tank*:

The developed and improved condition of the patent law, and of the principles which govern the exclusive rights conferred by it, leave no excuse for ambiguous language or vague descriptions. The public should not be deprived of rights supposed to belong to it, without being clearly told what it is that limits these rights. . . . *It seems to us that nothing can be more just and fair, both to the patentee and to the public, than that the former should understand, and correctly describe, just what he has invented, and for what he claims a patent.*<sup>91</sup>

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88. See 35 U.S.C. §§ 132(a), 251 ¶ 1 (prohibiting new matter); see also *id.* § 120 (claiming priority to earlier-filed, pending applications); *id.* § 135(b) (limiting late claiming to provoke an interference to one year after a patent issued or application published); *Muncie Gear Works v. Outboard, Marine & Mfg. Co.*, 315 U.S. 759, 768 (1942) (revising restrictions on late-claiming); *Webster Elec. Co. v. Splitdorf Elec. Co.*, 264 U.S. 463, 471 (1924) (adopting additional restrictions on late-claiming). See generally 4 CHISUM ON PATENTS, *supra* note 37, §§ 10.09[c][2][iii], 11.05[1][b], 11.05[2].

89. See, e.g., *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 336 U.S. 271, 276-77 (1949); *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 275-78 (1877); *The Corn-Planter Patent (Brown v. Guild)*, 90 U.S. (23 Wall.) 181, 224 (1874); see also *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1340 (Fed. Cir. 2001) ("[R]eading a limitation from the written description into the claims" is "one of the cardinal sins of patent law.").

90. 94 U.S. 568 (1876).

91. *Id.* at 573-74 (emphasis added).

c) Mistakes

Since 1879, patentees have not been permitted to correct drafting errors except by timely seeking a reissued patent. Even then, correction is not permitted when the error is simply a failure to use broader claiming language and the lack of coverage of disclosed subject matter is apparent.<sup>92</sup> Further, no new matter may be introduced to correct a mistaken disclosure, and any substantially nonidentical, reissued claims may not apply retroactively.<sup>93</sup>

Particularly given the patentee's ability to expend greater care to avoid drafting mistakes, it should not be considered unfair to limit patentees to the remedy specified by Congress for broadening claim language. As the Court noted when establishing an equitable bar to late-filing of broadening reissue patents, if two years of public use without the inventor's consent constitutes abandonment and creates a bar to patent rights, "a public disclaimer in the patent itself should be construed equally favorable to the public."<sup>94</sup> Further, as Justice Black argued in dissent in *Graver Tank*:

this congressional plan adequately protects patentees from "fraud," "piracy," and "stealing." Unlike the Court's opinion, it also protects businessmen from retroactive infringement suits and judicial expansion of a monopoly sphere beyond that which a patent expressly authorizes. The plan is just, fair, and reasonable. In effect it is nullified by this decision undercutting what the Court has heretofore recognized as wise safeguards.<sup>95</sup>

2. *Limits to Language*

The preceding analysis was premised on patentees choosing (expressly or mistakenly) to claim less than they had invented or disclosed. But the

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92. See, e.g., *Miller v. Bridgeport Brass Co.*, 104 U.S. 350, 352 (1881); *Leggett v. Avery*, 101 U.S. 256, 259-60 (1879).

93. See 35 U.S.C. §§ 251 ¶ 1, 252 ¶ 1.

94. *Miller*, 104 U.S. at 352; cf. *Shepard v. Carrigan*, 116 U.S. 593, 598 (1886) (holding that, given that the inventor could not obtain a reissue on a broader claim that had been abandoned, she could not argue in an infringement action to "enlarge her patent by argument, so as to cover elements not falling within its terms, and which she had explicitly abandoned") (citation omitted).

95. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 615-16 (1950) (Black, J., dissenting); see *Hilton Davis Chem. Co. v. Warner Jenkinson Co.*, 62 F.3d 1512, 1560-72 (Fed. Cir. 1995) (en banc) (Nies, J., dissenting) (discussing the lack of statutory support for the modern doctrine of equivalents, the relief provided by reissue for failing to claim more broadly, potential application of intervening rights, and the limitation of the doctrine of equivalents to known equivalents), *rev'd*, 520 U.S. 17 (1997).

same analysis applies even more strongly if patentees *cannot* fully disclose or claim what they invent, based on the limits of language used to describe inventions.<sup>96</sup> If they cannot fully disclose their inventions, patentees could never fulfill the quid pro quo of a written description that would entitle them to complete protection. Conversely, if they can fully disclose but cannot fully claim their inventions, patentees would necessarily disclose such broader inventive principles at the risk of an implied disclaimer. Absent a mistake, the patentee would make its choice to seek patent protection advisedly. There is nothing inherently unfair about holding patentees to their conscious choices (whether or not mistaken). However, utilitarian considerations (such as encouraging disclosure) might provide reasons to waive strict compliance.

Further, assuming that there are limits to language that prevent claiming the full scope of an invention, the modern doctrine of equivalents is not a necessary or inevitable means of assuring a fair scope of protection for inventors. This should be evident from the range of approaches to these issues under the European Patent Convention, which does not recognize a modern doctrine of equivalents that extends patent protection beyond the scope of application of interpreted claim language:

According to United Kingdom practice, literal (or “textual”) infringement typically was the patentee’s only remedy. Although placing a heavy burden on patent attorneys in drafting claims, this practice of course facilitated subsequent infringement evaluation. However, quite broad claims were normally granted by the UK Patent Office, probably as a reflex of the strict interpretation of the local courts. In contrast, the German approach to both claim interpretation and infringement relied on interpreting patent claims broadly. Therefore, the claim language was heavily stretched beyond its strict literal meaning when adopting the [historic] doctrine of equivalents. This also had the consequence that the German Patent Office required more specific, concrete claim language, due to the more liberal interpretation of the claims by local courts.<sup>97</sup>

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96. See *Autogiro Co. of Am. v. United States*, 384 F.2d 391, 396 (Ct. Cl. 1967) (converting physical inventions to words “allows for unintended idea gaps which cannot be satisfactorily filled,” because the invention is new and words do not yet exist to describe it).

97. Alessandro Steinfl, *The Doctrine of Equivalents Through the Eyes of the European Patent Convention*, CASRIP PUBLICATION SERIES: RETHINKING INTERNATIONAL INTELLECTUAL PROPERTY 114, 117 (2000), available at <http://www.law.washington.edu/casrip/Symposium/Number6/Steinfl.pdf>; see *Kirin-Amgen, Inc. v.*

The limits-to-language rationale of *Graver Tank* thus reflects a judicial policy judgment: the cost of drafting broader or more precise claims or the risk of inadequate protection from any inability to do so should be borne not by the inventor but rather by the public. As noted above, the purported fairness of this policy is contradicted by the history of American patent law and precluded by the Patent Act's distinct claiming and reissue requirements. For this reason, many judges and commentators have suggested the modern doctrine should be limited in its application to unforeseeable later-arising technologies that could not be claimed even with increased expenditures on claim drafting.<sup>98</sup> Counter-intuitively, application of the modern doctrine of equivalents to such later-arising technologies is not justifiable on utilitarian grounds, "because the doctrine will not save refinement costs or significantly improve the incentive to invent in such cases."<sup>99</sup>

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Hoechst Marion Roussel Ltd. [2004] U.K.H.L. 46, ¶ 44 (H.L. Oct. 21, 2004), available at <http://www.parliament.the-stationery-office.co.uk/pa/ld200304/ldjudgmt/jd041021/kirin-1.htm> (Article 69 of the European Patent Convention "firmly shuts the door on any doctrine which extends protection outside the scope of the claims."); *id.* ¶ 25 ("The second sentence [of the Protocol on the Interpretation of Article 69] . . . makes it clear that one cannot go beyond the claims to what, on the basis of the specification as a whole, it appears that 'the patentee had contemplated.'"); *id.* ¶ 49 ("Although article 69 prevents equivalence from extending protection outside the claims," new article 2 added to the Protocol on the Interpretation of Article 69 by the Munich Act of Nov. 29, 2000 revising the European Patent Convention makes clear that equivalents may be considered "an important part of the background of facts known to the skilled man which would affect what he understood the claims to mean.").

98. See, e.g., *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558, 619 (Fed. Cir. 2000) (en banc) (Rader, J., concurring-in-part and dissenting-in-part) (justifying the doctrine of equivalents because it "accommodates the unforeseeable dilemma for claim drafters" in regard to after-arising technology); Cianfrani, *supra* note 81, at 54 (arguing that the inability to claim the entire invention at any reasonable cost provides a basis for application of the modern doctrine to provide protection); cf. *Festo*, 234 F.3d at 264 (Linn, J., concurring-in-part and dissenting-in-part) (arguing that inherent limitations of language have justified broader equivalents protection for all claims).

99. Meurer & Nard, *supra* note 81, at 45; see also *id.* at 8 (arguing that the doctrine is not justified for "startlingly new equivalents" that could not be claimed with greater conceptual effort); *id.* at 41 (noting fairness rationales asserted by courts and commentators for protecting unforeseeable later-arising equivalents and explaining that "the benefit of centralized development [of later-arising technologies promoted by the modern doctrine] is low, the costs of preemptive refinement [of claim language to prevent competition] is low, the loss of incentive to invent [without the modern doctrine] is low, and the ex post gain from imitation [*i.e.*, designing around] is high").

### 3. *Encouraging Disclosures*

The Supreme Court in *Graver Tank* failed to supply any economic theory or empirical data to ground its argument that the modern doctrine is needed to encourage the disclosure of inventions. The implied premise of the argument (in crude form) is that reducing the scope of protection by eliminating the modern doctrine would decrease the value of patents, which in turn would decrease *ex ante* incentives either to invent what could be disclosed or to disclose inventions through patents.<sup>100</sup> Whether patentees do, or rationally should, rely on the protection afforded by the modern doctrine when making decisions to invent or to disclose is discussed below in Part IV. It suffices here to state that such arguments are not fairness arguments and that *all* of the costs and benefits of the modern doctrine should be weighed in the utility calculus. Thus, any purported benefits of encouraging invention or disclosure provided by the modern doctrine must be evaluated along with the social costs that the modern doctrine imposes, including but not limited to discouragement of sequential invention and disclosure.<sup>101</sup> As discussed in Part IV, there are good reasons to believe that the costs of the modern doctrine substantially outweigh any purported benefits.

#### B. *Warner-Jenkinson's Rationales*

In *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*,<sup>102</sup> the Supreme Court articulated two related reasons (and may have suggested a third) why patent protection should extend beyond the scope of application of construed claim language. The first rationale is based on the philosophical belief that equivalents to embodiments of claimed inventions (including later-arising equivalents) are factually the same thing as the claimed inventions.<sup>103</sup> The second rationale is based on the belief that claim language contains an "implied term" that includes as embodiments all factual equivalents of the claimed, enumerated embodiments.<sup>104</sup> The third rationale is based on the doctrinal policy that patent law should avoid finding implied-in-law disclaimers of disclosed, patentable subject mat-

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100. See, e.g., Cianfrani, *supra* note 81, at 44-46 (discussing effects of equivalents protection on invention). A more complex account of the economic incentives is provided by Meurer & Nard, *supra* note 81, at 33-42.

101. See, e.g., Cianfrani, *supra* note 81, at 50 ("The doctrine of equivalents should be eliminated in situations where its value to the patentee is small, but the costs of its application to society is large.").

102. 520 U.S. 17 (1997).

103. See *id.* at 35-37.

104. See *id.* at 34-35.

ter.<sup>105</sup> Again, the history of American patent law demonstrates that these rationales are misguided.

### 1. *Factual Equivalency*

In *Warner-Jenkinson*, the Supreme Court authorized patent protection under the modern doctrine of equivalents based on the factual similarity of the accused product or process to the embodied limitations of the construed claims. The Court focused on the knowledge of interchangeability of elements as a factual matter, and on “what it tells the fact-finder about the similarities or differences between those elements.”<sup>106</sup> Significantly, the Court stated that:

“[T]he substantial equivalent of a thing, in the sense of the patent law, is the same as the thing itself” . . . . If the essential predicate of the doctrine of equivalents is the notion of identity between a patented invention and its equivalent, there is no basis for treating an infringing equivalent any differently from a device that infringes the express terms of the patent.<sup>107</sup>

Thus, the Supreme Court treated equivalency judgments based on factual similarity to be the same as category judgments of identity (based on application of the construed claim language). The Court thereby not only changed the role of the jury and the question that it must answer to determine infringement,<sup>108</sup> but also potentially shifted the theoretical basis for providing patent protection. Under the Court’s rationale, juries might incorporate into their factual similarity judgments perceptions of the fairness of extending patent protection. Although it may be difficult to define the

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105. *See id.* at 37.

106. *Id.*

107. *Id.* at 35 (quoting *Union Paper-Bag Mach. Co. v. Murphy*, 97 U.S. 120, 125 (1878), and noting reliance on that decision by the Court in *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607 (1950)).

108. *See, e.g.*, William R. Zimmerman, *Unifying Markman and Warner-Jenkinson: A Revised Approach to the Doctrine of Equivalents*, 11 HARV. J.L. & TECH. 185, 260-61 (1997) (noting that the right to a jury determination of infringement is based on determining “issues relating to the accused product or process” and arguing that having juries compare the accused product or process to the claims and determine equivalency “leaves more to the jury than mere resolution of disputes concerning the accused product or process”); *cf.* Jennifer D. Threadgill, *Equivocating Between Equivalents and Equity in Patent Infringement: Hilton Davis Chemical Co. v. Warner-Jenkinson Co.*, 51 ARK. L. REV. 191, 204 (1998) (noting that *Graver Tank* was an appeal from a bench trial and thus the Supreme Court did not discuss the role of the jury under the doctrine of equivalents) (citing *Hilton Davis Chemical Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1543 (Fed. Cir. 1995) (en banc) (Plager, J., dissenting), *rev’d*, 520 U.S. 17 (1997)).

philosophical differences between factual and theoretical or political knowledge, there are at least clear practical differences between factual and legal judgments, which are explored below.

a) Construction and Application Versus Equivalency and Vitiating

Under current law, construction and application of claims and findings of equivalency are performed by different institutional actors<sup>109</sup> at different times.<sup>110</sup> Juries once performed many aspects of claim construction in addition to applying claim language to determine infringement by assessing factual identity of substituted elements.<sup>111</sup> But even if performed at the same time, claim construction and application are different from each other, and from factual determinations of equivalency (similarity) under the modern doctrine. Patent Office and district court approaches to claims and the corresponding appellate court review standards also differ with respect to claim construction, direct application, and factual equivalency. As a result, each entity differs in regard to institutional power arrangements and to the predictable scope of application of particular patents.<sup>112</sup> These differences are explored further below in Part V.

It suffices here to say that the Supreme Court in *Markman* denied juries any policymaking discretion to interpret claim scope, and in *Warner-Jenkinson* recognized the need to more strictly enforce judicially enforced

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109. See Nard, *supra* note 7, at 64-79 (discussing differing institutional allocations of interpretive authority over claim meaning, application of the doctrine of equivalents, and certainty, uniformity, and issue preclusion considerations); Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035, 1042-64 (2003) (distinguishing factual and legal judgments performed by the Patent Office, district court judges, juries, and appellate judges reviewing Patent Office, district court judge, and jury determinations under various doctrinal standards).

110. See *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 385-91 (1996) (requiring judicial construction of claims prior to jury deliberations); cf. Raymond P. Niro & Joseph N. Hosteny, III, *Markman: An Infringer's Delight; An Inventor's Nightmare*, 3 SEDONA CONF. J. 69, 70-71 (2002) (criticizing the practice of holding *Markman* hearings early in a case, prior to receiving evidence and to framing jury instructions).

111. See Karl B. Lutz, *Questions of Fact and Questions of Law in Patent Litigation*, 17 U. PITT. L. REV. 623, 635-36 (1956) (many issues once decided by juries but later found to relate to claim construction are now decided by judges).

112. See Nard, *supra* note 7, at 43-53 (arguing that such institutional efforts to achieve rigid certainty and predictability by ignoring the extrinsic context of claim meaning are inconsistent and philosophically unsound); Rai, *supra* note 109, at 1039-40 (discussing the need for "multi-institutional analysis" of relative institutional competence and its effects on innovation policy; criticizing Federal Circuit decisions to achieve greater certainty for failing to provide sufficient flexibility purportedly needed to improve innovation policy).

legal limits on juries' factual equivalency determinations.<sup>113</sup> The Court thus limited the degree to which factual similarities may override limitations of claiming language. Perversely, the Court in *Warner-Jenkinson* created from whole cloth a new legal doctrine—vitiating claim elements—to cabin its simultaneous expansion of juror discretion to override claim limitations. Vitiating is based on, but is not limited to, construed claim language.<sup>114</sup> The Court thus simultaneously loosed patent scope determinations from their historical moorings in claim-language, claim-scope, and claim-interpretation doctrines and tethered them (on a longer leash) to the very same claims and claim language. The Court did not articulate any standard for vitiation, and did not provide either a deontological (fairness) or utilitarian (efficiency) framework from which to assess vitiation. However, the Court was at least consistent in imposing its new legal limitation on juror discretion at the same level of generality of invention on which factual equivalency was to be determined.

b) Time of Infringement and Historic Limits on Patent Scope

The Supreme Court further held that factual equivalency is to be determined at the time of infringement, considering objective understanding of technology at that time.<sup>115</sup> Because it was focused on factual similarity of the accused device to the claimed invention, the Court extended equivalents protection to later-arising technological equivalents, subject only to the limits imposed by the vitiation standard. In doing so, the Court created theoretical problems and doctrinal conflicts.

Historic limits on the application of claims to later-arising technologies reflect two utilitarian considerations of constitutional magnitude. First, claims may not apply to prior art and thereby withdraw subject matter from the public domain and place it under an exclusive monopoly.<sup>116</sup>

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113. *See Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 39 n.8 (1997) (discussing the need for judges to more routinely issue summary judgment regarding factual findings of equivalence, and partial summary judgment and judgments as a matter of law regarding prosecution history estoppel and disclaimer doctrines); *Markman*, 517 U.S. at 387-90 (noting the relative importance in determining claim meaning of judicial ability to construe written documents compared to jurors abilities to assess witness demeanor, motivations, and community standards).

114. *See Warner-Jenkinson*, 520 U.S. at 39 n.8.

115. *See id.* at 37.

116. *See Pfaff v. Wells*, 525 U.S. 55, 64-65 (1998) (stating that statutory novelty limitations are consistent with the constitutional end of excluding from patent protection ideas already in the public domain); *Graham v. John Deere Co.*, 383 U.S. 1, 5-6 (1966) (holding that 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”).

Such monopoly rights are justly condemned as “odious,” having a long history in abusive issuance of royal privileges by British monarchs.<sup>117</sup> To avoid this result, patents for “improvements” are construed narrowly to exclude the prior art.<sup>118</sup> As a result, the level of generality of a patented improvement invention is necessarily less than for a pioneering invention, and improvement claims apply to (and treat as factually equivalent embodiments) a narrower range of substitutions.<sup>119</sup> Improvement claims historically were understood to exclude factual equivalents that were not known to be substitutes at the time the patent issued.<sup>120</sup> Congress likely did not intend to alter this result in the 1952 Patent Act, when authorizing use of so-called means-plus-function and step-plus-function claiming language.<sup>121</sup>

Jury findings of factual equivalency that apply current technological knowledge need not consider or evaluate the scope of the patented inventive principle. Thus, later-arising technologies (including patentable inventions) may be found to infringe as equivalents, even though the original principle of an improvement is narrow and should not extend to the equivalent.<sup>122</sup> These historic limits on patent scope will be imposed only if judges are careful to apply them under the vitiation standard. But given the

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117. *Proprietors of the Charles River Bridge v. Proprietors of the Warren Bridge*, 36 U.S. 420, 567 (1837) (holding that statutory monopolies over existing trades are odious because they withdraw the community’s common right, injure trade, and reduce overall prosperity); *see Bienville Water Supply Co. v. City of Mobile*, 186 U.S. 212, 220 (1902) (citing *Darcy v. Allein*, 77 Eng. Rep. 1260 (K.B. 1602) (“*Case of The Monopolies*”)) (same). *See generally* Edward C. Walterscheid, *The Early Evolution of the United States Patent Law: Antecedents (Part 2)*, 76 J. PAT. & TRADEMARK OFF. SOC’Y 849, 862-71 (1994) (discussing odious monopolies); *id.* at 871-80 (discussing enactment of the Statute of Monopolies to curb such abuses).

118. *See, e.g., Woodcock v. Parker*, 30 F. Cas. 491 (C.C.D. Mass. 1813) (No. 17,971) (Story, J.); *Odiorne v. Winkley*, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432) (Story, J.).

119. *See Evans v. Eaton*, 20 U.S. (7 Wheat.) 356, 380 (1822); *see also Weber Elec. Co. v. E.H. Freeman Elec. Co.*, 256 U.S. 668, 669, 677-78 (1921) (citing cases); *Knapp v. Morss*, 150 U.S. 221, 230 (1897) (Because it was at most a narrow improvement, the patent was “neither entitled to a broad construction, nor can any doctrine of equivalents be invoked so as to make the appellants’ device an infringement.”).

120. *See, e.g., Halliburton Oil Well Cementing Co. v. Walker*, 329 U.S. 1, 13 (1946); *Seymour v. Osborne*, 78 U.S. (11 Wall.) 516, 555-56 (1870).

121. *See* 35 U.S.C. § 112 ¶ 6 (2000); *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1310-11 (Fed. Cir. 1998). *See generally* Sarnoff, *Historic and Modern DOEs, Part II, supra* note 32, *passim*.

122. Stated differently, the earlier patent should not block the later-arising substituted equivalent, but rather the later-arising substituted equivalent should be considered to design around the earlier invention.

express authorization of the Supreme Court to determine equivalency at the time of infringement, judges are unlikely to find that later-arising technology would vitiate the meaning of a claimed improvement. Furthermore, even for existing substitute technologies, the use of hypothetical claim construction to avoid protecting equivalents that were already in the public domain<sup>123</sup> will not adequately reflect the historic limits on patent scope for improvement inventions. This is because hypothetical claim will not directly limit the generality of the principle of the protected invention, but rather will only bar application of the modern doctrine when the equivalent at issue was in the public domain.

Second, to effectuate the constitutional purpose of patent law,<sup>124</sup> patents for pioneering inventions could not extend to too many future embodiments, and thereby “foreclose efforts to discover” and “discourage rather than promote invention.”<sup>125</sup> Even pioneering inventions may not be claimed at a level of generality that imposes an excessive tax on the public and on sequential innovation, by conveying exclusive rights to subsequent discoveries without requiring the inventor to disclose them. The policy concerns underlying limits to the level of generality of claim scope were articulated in 1853 in *O’Reilly v. Morse*.<sup>126</sup>

But yet if [a subsequent invention] is covered by this patent the inventor could not use it, nor the public have the benefit of it without the permission of this patentee.

Nor is this all, while he shuts the door against inventions of other persons, the patentee would be able to avail himself of new discoveries in the properties and powers of [the principle] which scientific men might bring to light . . . . And if he can secure the exclusive use by his present patent he may vary it with every new discovery and development of the science, and need place no description of the new manner, process, or machinery, upon the records of the patent office. And when his patent expires, the public must apply to him to learn what it is. 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 de-

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123. See, e.g., *Wilson Sporting Goods Co. v. David Geoffrey & Assocs.*, 904 F.2d 677, 684-85 (Fed. Cir. 1990) (articulating the hypothetical claim construction approach).

124. See U.S. CONST. art. I, § 8, cl. 8 (“To promote the Progress of Science and useful Arts . . .”).

125. *Holland Furniture Co. v. Perkins Glue Co.*, 277 U.S. 245, 257 (1928).

126. 56 U.S. (15 How.) 62 (1853).

scribe when he obtained his patent. The court is of opinion that the claim is too broad, and not warranted by law.<sup>127</sup>

By authorizing factual equivalency judgments for later-arising technologies subject only to the vitiation standard, the Supreme Court elided these historic limits on pioneering claim scope and application. In doing so, the Court also shifted the theoretical frame for patent protection. The Court not only eliminated its earlier utilitarian-based constraints, but also authorized juries to adopt fairness-based policy judgments under the guise of determining factual equivalency. Worse yet, judges now are unlikely to find claim limitations to be vitiated by equivalency findings when such broad protection would be bad for society (as determined by patent law claiming doctrines), but rather only when such protection necessarily conflicts with the meaning of claim language.<sup>128</sup> In contrast, the Supreme Court presumably left in place the so-called reverse doctrine of equivalents, which operates to limit interpretation of claims to prevent their application to later-arising improvement technologies that are too much changed from the invented, disclosed, and claimed principle.<sup>129</sup>

## 2. *Implied Claim Terms*

As further justification for extending equivalents protection beyond the scope of application of construed claims, the Supreme Court in *Warner-Jenkinson* suggested that the modern doctrine of equivalents is a necessary result of:

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127. *Id.* at 113.

128. *See, e.g.,* *Searfoss v. Pioneer Consol. Corp.*, 374 F.3d 1142, 1151 (Fed. Cir. 2004) (finding vitiation because equivalents protection “would require [the] court to ignore the [claim] construction”); *Ericsson, Inc. v. Harris Corp.*, 352 F.3d 1369, 1374-75 (Fed. Cir. 2003) (discussing claim language that inherently excludes “its very antithesis”) (citing *Moore U.S.A., Inc. v. Standard Register Co.*, 229 F.3d 1091, 1106 (Fed. Cir. 2000)); *SciMed Life Sys. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1346 (Fed. Cir. 2001) (excluding from equivalents protection any “plainly and necessarily excluded . . . structural feature[s] . . . opposite of the one recited in the claim”).

129. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608-09 (1950) (holding that when a device “is so far changed in principle” that it performs the same function “in a substantially different way,” the doctrine of equivalents “may be used to restrict the claim”); *see* *Boyden Power Brake Co. v. Westinghouse*, 170 U.S. 537, 573 (1898) (The scope of application of literal claim language should be restricted when “the means used in accomplishing this function are so different that we find it impossible to say, even in favor of a primary patent, that they are mechanical equivalents.”). Because the reverse doctrine of equivalents—unlike the modern doctrine—imposes limits on construction of the claim language, it should be determined by judges and should have preclusive effects in subsequent cases.

a legally implied term in each patent claim that “the claim extends to the thing patented, however its form or proportions may be varied.” Under that view, application of the doctrine of equivalents involves determining whether a particular accused product or process infringes upon the patent claim, where the claim takes the form—half express, half implied—of “X and its equivalents.”<sup>130</sup>

The Court thereby denied any difference in treatment between claim construction and direct application on the one hand and equivalents protection on the other.<sup>131</sup>

As just discussed, there is a substantial difference between equivalents that are embodiments of the construed claim language and those to which the construed claims do not directly apply. In any event, the Supreme Court long-ago rejected the idea that making reference in the claims to a broader disclosure in the specification (such as by using the term “substantially as described”) could vary the meaning of clear claim terms and thereby expand or limit the meaning and scope of application of the claim.<sup>132</sup> Claims are to be construed in light of the specification, but clear claim language having a meaning that varies from the specification must be given effect.<sup>133</sup> Clear (or ambiguous but definitively construed) claim language thus should apply directly only to factual equivalents that are embodiments of such language, and could not contain any implied term that would extend to factual equivalents that are not embodiments. Rather, the application of patents to such equivalents should necessarily vitiate the meaning of clear claim language, and ambiguous claim language simply should not be allowed.<sup>134</sup>

Further, many claims that contained such implied terms could not properly issue from the Patent Office, at least not without a disclaimer for

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130. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 35 (1997) (citing *Winans v. Denmead*, 56 U.S. (15 How.) 330, 343 (1854)).

131. *See id.*

132. Although the Supreme Court originally allowed claims to import the contents of the specification, the Court stopped the practice shortly after adoption of the distinct claiming provision in the 1870 Patent Act. *See, e.g.*, *Seymour v. Osborne*, 78 U.S. (11 Wall.) 516, 547 (1870); *Burr v. Duryee*, 68 U.S. (1 Wall.) 531, 567-68 (1863); *cf.* 35 U.S.C. § 112 ¶ 2 (2000). *But cf.* *Claude Neon Lights, Inc. v. E. Machlett & Son*, 36 F.2d 574, 575 (2d Cir. 1929) (discussing expansion of claims by resort to the specification).

133. *See, e.g.*, *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 275-78 (1877).

134. *See, e.g.*, *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 236 (1942) (“The statutory requirement of particularity and distinctness in claims is met only when they clearly distinguish what is claimed from what went before in the art and clearly circumscribe what is foreclosed from future enterprise.”).

the impliedly included, factually equivalent embodiments. Before issuance, the Patent Office is required to give claims their broadest reasonable construction.<sup>135</sup> Narrow improvement claims that impliedly included such equivalents would encompass the prior art and, thus, would be unpatentable whenever the claim limitations substituted for, rather than added to, prior art limitations.<sup>136</sup> In such cases, protection necessarily would extend beyond the literal limitations that distinguished the claim from the prior art. Similarly, pioneering invention claims that impliedly included nonliteral equivalents of claim limitations would be unpatentable whenever patent scope was extended beyond permissible claim-language and claim-scope limits.<sup>137</sup>

Similarly, issued improvement and pioneering claims containing such implied terms would frequently be invalid, even though claims are more narrowly construed by courts. Claims containing such implied terms either might extend beyond what was actually invented, disclosed, or enabled, or might not be distinctly claimed.<sup>138</sup> Further, claims are to be interpreted for validity based on their meaning at the time of filing. In unpredictable arts, claims for pioneering inventions containing such implied terms necessarily should be invalid. This is because the claims would be understood at the time of filing to apply to all sorts of unclaimable equivalents that had not yet been invented, were not yet enabled, and could not be described without adding new matter (that had not been invented by the applicant or anyone else).<sup>139</sup> Finally, unless the scope of equivalents encompassed by such an implied term were foreseeable, including the implied term within the claim would violate the spirit of public notice that animates these claim-language and claim-scope doctrines.<sup>140</sup>

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135. *See supra* note 11 and accompanying text.

136. *See supra* notes 59-60, 116-20 and accompanying text.

137. *See supra* notes 52, 58, 124-27 and accompanying text.

138. *See supra* note 52 and accompanying text; *cf.* *Mitchell v. Tilghman*, 86 U.S. (19 Wall.) 287, 391-92, 404 (1874) (interpreting a functional claim to have a limited range of application to unenumerated embodiments in order to preserve validity, and as not intending to claim all means of performing the function).

139. *Cf.* *Edison Elec. Light Co. v. Boston Incandescent Lamp Co.*, 62 F. 397, 398-99 (C.C.D. Mass. 1894) (holding that newly discovered substances or devices substituting for previously known elements are within the scope of pioneering claims because "it is difficult to point out in this class of cases what known equivalents existed at the date of the patent, for the reason that the combination of elements in which the invention is embodied was first made known by the patentee").

140. *See supra* notes 55-57 and accompanying text.

### 3. *Avoiding Implied Disclaimers*

Some dicta in *Warner-Jenkinson* may be construed to suggest that the Supreme Court, by authorizing equivalents protection, sought to avoid unintentional, implied-in-law disclaimers. The dicta immediately followed the Court's holding that the doctrine of equivalents is not limited to known equivalents because equivalency is determined based on later-arising knowledge. The Court wrote:

[R]ejecting the milder version of petitioner's argument necessarily rejects the more severe proposition that equivalents must not only be known, but must also be actually disclosed in the patent in order for such equivalents to infringe upon the patent.<sup>141</sup>

By focusing on what was "actually disclosed," the Court may have suggested a concern that patentees should not forfeit protection for equivalents that they did not explicitly contemplate and consciously exclude from their claims (as would be evidenced by enumeration in the patent specification of unclaimed equivalents).<sup>142</sup>

The Supreme Court's reference to what was "actually disclosed," however, should not be understood to prevent patentees from waiving protection for impliedly disclosed but unclaimed equivalents. It has long been settled that an implied-in-law dedication or disclaimer can result from a failure to adopt sufficiently broad claims, without regard to a patentee's intent. As the Court held in 1881 in *Miller v. Bridgeport Brass Co.*, "the claim of a specific device or combination, and an omission to claim other devices or combinations apparent on the face of the patent, are, in law, a dedication to the public of that which is not claimed."<sup>143</sup> As recognized by the Federal Circuit, specifications disclose and dedicate to the public all unclaimed equivalents that are explicitly or implicitly identifiable to skilled artisans in the relevant technology.<sup>144</sup>

Further, patentees impliedly disclaim unclaimed equivalents that were foreseeable at the time of filing even if those equivalents were not disclosed. This is because patentees should not receive protection for what they could have disclosed and claimed, but intentionally or mistakenly chose not to disclose or claim in the patent.<sup>145</sup> Thus, patentees are es-

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141. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 37 (1997).

142. *See supra* note 67 and accompanying text.

143. 104 U.S. 350, 352 (1881).

144. *See PSC Computer Prods., Inc. v. Foxconn Int'l, Inc.*, 355 F.3d 1353, 1360 (Fed. Cir. 2004).

145. *See, e.g., Glaxo Wellcome, Inc. v. Impax Labs., Inc.*, 356 F.3d 1348, 1354-55 (Fed. Cir. 2004) (Patentees must claim "readily known equivalents" at the time of

topped from equivalents protection for known but undisclosed equivalents that were not specifically disclosed and that could not validly be included in generic claims.<sup>146</sup> Significantly, these implied disclaimer doctrines were adopted to assure fairness to the public, notwithstanding any hardship that they might impose on patentees. As the Court also noted in *Miller*, “no one should be relieved who has slept upon his rights, and has thus led the public to rely on the implied disclaimer involved in the terms of the original patent.”<sup>147</sup>

### C. *Festo’s Rationales*

In *Festo*, the Court articulated similar reasons to those in *Graver Tank* to support protection for equivalents that were not (and could not be) claimed by the patentee. The Court stated:

The language in the patent claims may not capture every nuance of the invention or describe with complete precision the range of its novelty. If patents were always interpreted by their literal terms, their value would be greatly diminished. Unimportant and insubstantial substitutes for certain elements could defeat the patent, and its value to inventors could be destroyed by simple acts of copying. For this reason, the clearest rule of patent interpretation, literalism, may conserve judicial resources but is not necessarily the most efficient rule. The scope of a patent is not limited to its literal terms but instead embraces all equivalents to the claims described.<sup>148</sup>

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application and cannot rebut the *Festo* presumption by invoking failure to disclose such equivalents.); *Ranbaxy Pharms., Inc. v. Apotex, Inc.*, 350 F.3d 1235, 1241 (Fed. Cir. 2003) (Known similar properties of chemical substitutes making them equivalent would also make claiming them foreseeable.); *supra* note 49 and accompanying text.

146. *See* *SmithKline Beecham Corp. v. Excel Pharms., Inc.*, 356 F.3d 1357, 1361-62, 1364 & n.2 (Fed. Cir. 2004) (noting that more specific claims would have constituted new matter that might have been claimed by filing a continuation-in-part application, given that broader generic claims had been amended to overcome an examiner’s rejection for lack of enablement, and remanding on foreseeability of the unclaimable equivalent species) (citing *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 734 (2002)); *cf.* *Singh v. Brake*, 317 F.3d 1334, 1343-46 (Fed. Cir. 2003) (upholding adequacy of written description and enablement of species claim corresponding to the count in an interference).

147. *Miller v. Bridgeport Brass Co.*, 104 U.S. 350, 356 (1881).

148. *Festo*, 535 U.S. at 731-32 (citing *Winans v. Denmead*, 56 U.S. (15 How.) 330, 343 (1853)). As in *Graver Tank* and *Warner-Jenkinson*, by relying on *Winans* to support extension of patent protection beyond the scope of application of construed claim language, the Court in *Festo* misunderstood the relevant history and nature of the modern

As in *Graver Tank*, the Supreme Court in *Festo* focused on the decreased value of patents resulting from copying and on the limits to language.<sup>149</sup> The Court, however, apparently converted *Graver Tank*'s concern for placing inventors "at the mercy of verbalism"<sup>150</sup> from a fairness rationale into an efficiency rationale.<sup>151</sup> The Court also focused more in *Festo* on judicial efficiency than on social efficiency.<sup>152</sup>

The Court's nearly exclusive concern to protect the patentee and to preserve the value of inventions is deeply troubling. It fails to balance the rights of the public and eliminates from efficiency analyses all costs to the public, including but not limited to the tax on sequential innovation imposed by the modern doctrine. The Court's approach thus may impermissibly conflict with the utilitarian premises of the Constitution's patent power<sup>153</sup> and certainly reverses course from the Court's earlier history of assuring both notice to and fairness for the public.

Further, the Supreme Court's justification for the modern doctrine of equivalents reflects two serious errors of analysis. The Supreme Court may have been correct that claim language will not always fully describe an invented principle. But the Court's conclusion that the scope of the patent therefore "embraces *all* equivalents"<sup>154</sup> of the claims is a *non sequitur* and conflicts with the Court's prior limits on claim scope and with its vi-

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doctrine of equivalents. See Sarnoff, *Historic and Modern DOEs, Part I*, *supra* note 32, *passim*; Sarnoff, *Historic and Modern DOEs, Part II*, *supra* note 32, *passim*.

149. See *Festo*, 535 U.S. at 731-32; *id.* at 738 (discussing the "imperfect fit" of both original and amended claim language and the lack of "foresight in . . . drafting").

150. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950).

151. See *Festo*, 535 U.S. at 732-33 (finding that the uncertainty caused by the doctrine of equivalents is "the price of ensuring the appropriate incentives for innovation") (citing *Winans*, 56 U.S. (15 How.) at 343, and *Graver Tank*, 339 U.S. at 607).

152. In *Graver Tank*, the Court's efficiency concern related to discouraging disclosure of inventions, not to conserving judicial resources. 339 U.S. at 607.

153. See *supra* note 84 and accompanying text; *cf.* *Graham v. John Deere Co.*, 383 U.S. 1, 5-6 (1966) ("The Congress in the exercise of the patent power may not overreach the restraints imposed by the stated constitutional purpose."). See generally Paul J. Heald & Suzanna Sherry, *Implied Limits on the Legislative Power: The Intellectual Property Clause as an Absolute Constraint on Congress*, 2000 U. ILL. L. REV. 1119, 1153-54, 1162-63 (discussing the framers' intent to provide patents and copyrights as the quid pro quo for the public benefit of new creative effort); Tyler T. Ochoa & Mark Rose, *The Anti-Monopoly Origins of the Patent and Copyright Clause*, 84 J. PAT. & TRADEMARK OFF. SOC'Y 909, 912-28 (2002) (tracing anti-monopoly antecedents of the Progress Clause and their effect on its drafting and ratification history); Lawrence B. Solum, *Congress's Power to Promote the Progress of Science: Eldred v. Ashcroft*, 36 LOY. L.A. L. REV. 1, 10-53 (2002) (reviewing and interpreting the terminology of the Progress Clause).

154. *Festo*, 535 U.S. at 732 (emphasis added).

tiation standard for the modern doctrine. The Court's analysis also appears to be based on the false premise that patent claims must be "interpreted by their literal terms."<sup>155</sup> Whatever the degree to which it has been used in the past,<sup>156</sup> nonliteral interpretation of claim language is a permissible (and, as discussed below in Part V, a preferable) alternative to the modern doctrine of equivalents if additional, fairness-based protection is thought to be needed.

#### IV. THE MODERN DOCTRINE'S COSTS LIKELY OUTWEIGH ITS PURPORTED BENEFITS

The costs of the modern doctrine of equivalents to society likely are immense (billions of dollars each year) and certainly are growing. In the late 18th Century, some framers of the U.S. Constitution expressed concern that the social costs of *any* patent rights were too great to warrant granting patent-issuing powers to the U.S. Congress.<sup>157</sup> Since the first Patent Act in 1790, the courts and Congress have dramatically expanded patentable subject matter,<sup>158</sup> claim scope (particularly for pioneering inven-

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155. *Id.* at 731.

156. *See* *Claude Neon Lights, Inc. v. E. Machlett & Son*, 36 F.2d 574, 575 (2d Cir. 1929) (Hand, J.) ("Such a limitation [to generous, literal construction of claim language] is however irreconcilable with those extremely numerous decisions which have extended a claim to structures which by no possibility it could cover, judged by any tenable canons of documentary interpretation.").

157. *See, e.g.*, V WRITINGS OF THOMAS JEFFERSON 45, 47 (Ford ed. 1895) ("[T]he benefit of even limited monopolies [as incitements to ingenuity] is too doubtful to be opposed to that of their general suppression."). *See generally* Edward C. Walterscheid, *The Use and Abuse of History: The Supreme Court's Interpretation of Thomas Jefferson's Influence on the Patent Law*, 39 IDEA 195 (1999) (discussing changes in Jefferson's views over time).

158. Early limitations on patentable subject matter and utility have been relaxed, expanding the range of patentable inventions and allowing patents where the only disclosed utility is for research and subsequent innovation. *See, e.g.*, *Diamond v. Diehr*, 450 U.S. 175 (1981) (finding mathematical algorithms as parts of machines patentable); *Diamond v. Chakrabarty*, 447 U.S. 303 (1980) (finding genetically modified organisms patentable); *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998) (finding business methods patentable); *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994) (finding software patentable); U.S. Patent and Trademark Office, Utility Examination Guidelines, 66 Fed. Reg. 1092, 1093-96 (Jan. 5, 2001) (stating that patents may issue for any "specific, substantial, and credible utility" and rejecting comments for limiting subject matter and raising utility requirements for DNA and genetic patents); *cf. Gottschalk v. Benson*, 409 U.S. 63 (1972) (holding mathematical algorithms not patentable); *Brenner v. Manson*, 383 U.S. 519, 534-45 (1966) (raising the need for a "specific benefit [that] exists in currently available form").

tions),<sup>159</sup> patent duration,<sup>160</sup> and infringement rights.<sup>161</sup> Litigation to enforce patent rights has become increasingly common.<sup>162</sup> Thus, concern over the modern doctrine and the expanded and more uncertain patent scope it engenders should have increased dramatically.<sup>163</sup> There are substantial reasons to fear that the costs of the modern doctrine greatly outweigh any benefits that the doctrine purportedly provides. Similar concerns in copyright law have received more substantial attention, particularly in regard to the dramatic expansion of the copyright duration (and retrospective application to subsisting copyrights).<sup>164</sup>

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159. See 35 U.S.C. § 112 ¶ 6 (2000) (authorizing use of functional claim language); *supra* note 58 and accompanying text (noting expansion of permissible claiming language). Compare *Wood v. Underhill*, 46 U.S. (5 How.) 1, 5 (1847) (holding that invented principles are not patentable if they “cannot be used . . . without first ascertaining by experiment the proportion to be employed”), with *supra* note 52 and accompanying text (describing current enablement limit, i.e., “undue experimentation”).

160. Patent term originally extended no more than fourteen years from issue; it now runs twenty years from filing of the earliest application to which the claimed subject matter refers, subject to term extension for delays in Patent Office examination and to compensate for regulatory reviews of specific patented products. See 35 U.S.C. §§ 154(a), 155, 155A, 156; Act of April 10, 1790, ch. 7, § 1, 1 Stat. 109.

161. The original infringement right (providing a cause of action for damages without injunctive relief) did not cover offering to sell or importing the patented invention, or contributing to or inducing infringement by others in the U.S. or overseas. See Act of April 10, 1790, ch. 7, §§ 1, 4, 1 Stat. 109, 115; cf. 35 U.S.C. § 271 (current infringement rights). See generally *Dawson Chem. Co. v. Rohm & Haas Co.*, 448 U.S. 176, 189-220 (1980) (discussing development of contributory infringement rights); 5 CHISUM ON PATENTS, *supra* note 37, § 16.02 (discussing the origins of the various patent direct infringement rights).

162. See, e.g., Kimberly A. Moore, *Judges, Juries and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 384 tbl. 1 (2000) (providing statistics on the dramatic increase in patent cases filed from 1983 (940 cases) to 1999 (2191 cases)).

163. See, e.g., Glynn S. Lunney, Jr., *Patent Law, The Federal Circuit, and the Supreme Court: A Quiet Revolution*, 11 SUP. CT. ECON. REV. 1, 3-7, 67-78 (2003) (discussing benefits of lower levels of and more tailored protection, and expressing concerns over the costs of increased uniformity of protection from raising obviousness standards and from limiting claim scope and equivalents protection); Rai, *supra* note 109, at 1079-86 (discussing benefits of reducing uncertainty regarding the scope and validity of patent rights). See generally FED. TRADE COMM’N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY (2003) [hereinafter FTC REPORT], available at <http://www.ftc.gov/os/2003/10/innovationrpt.pdf>.

164. See, e.g., *Eldred v. Ashcroft*, 537 U.S. 186, 250 (2003) (Breyer, J., dissenting) (discussing significant social costs resulting from the need for or failure to obtain licenses, and concluding that there “is no legitimate, serious copyright-related justification for” term extension). See generally Diane L. Zimmerman, *Authorship Without Ownership: Reconsidering Incentives in a Digital Age*, 52 DEPAUL L. REV. 1121

## A. Direct and Opportunity Costs

The modern doctrine of equivalents results in substantial direct and opportunity costs to society. First, the expanded and more uncertain scope of patent protection provided by the modern doctrine results in additional costs of litigation, licensing, and analysis to determine whether patents apply to particular activities. Second, the expanded and uncertain scope of patent protection results in reduced levels of competition, which results in higher prices for and fewer beneficial alternatives to patented products and processes. Finally, the expanded and uncertain scope of patent protection results in opportunity costs of foregone innovation, which may result in reduced social welfare from the additional goods and services that otherwise would have been available. The costs imposed by the modern doctrine cumulate over time for each issued patent.

### 1. Litigation, Licensing, and Patent Analysis Costs

The expanded and uncertain scope of patent protection afforded by the modern doctrine of equivalents generates significant litigation-related costs.<sup>165</sup> For example, in 2002, 145 reported cases reached a final determination on equivalents infringement. After any appeals, 123 of the cases (roughly eighty-five percent) ultimately held for the accused infringer and twenty-two for the patentee on the doctrine of equivalents issue. The imbalance is striking. In the vast majority of cases in which alleged infringers are sued under the doctrine of equivalents, they are found not to infringe.<sup>166</sup> Society thus spends large amounts determining that patentees are not entitled to the additional protection they assert, even though *ex ante* they may not know that fact.

Millions of dollars are likely spent each year resolving and analyzing equivalents issues in patent cases and in business negotiations and evaluations. In regard to litigation, the average cost of a single patent case has

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(2003) (discussing cultural production incentives in the context of earlier and modern copying technologies and copyright and related laws).

165. See *Festo Corp. v. Shoketsu Kinzoku Kogyu Kabushiki Co.*, 535 U.S. 722, 732 (2002) (discussing concerns over reduced competition, wasted investment, and wasteful litigation).

166. See *Decisions for 2002*, *supra* note 15. The odds of successful assertion of the doctrine of equivalents could be lower than the reported figures, given that the claims may be held invalid or unenforceable and because weaker claims of equivalence infringement may be settled or dismissed before judicial disposition. However, data regarding settlements of asserted claims do not exist, and even if they did, it would not be possible to determine whether the asserted coverage under the doctrine of equivalents was more likely to be correct (and based on valid claims) or that the costs and risks of litigation were thought to be too high to proceed to judgment.

been estimated at \$800,000 through completion of discovery and \$1.5 million through trial.<sup>167</sup> The costs of litigating all issues in cases where the accused infringer was found not to infringe under the modern doctrine thus can be estimated to exceed \$100 million per year. Presumably, many of these patent cases would be resolved at substantially less expense or would not be brought in the first place absent the expanded and uncertain protection provided by the modern doctrine. Because holdings under the modern doctrine pose questions of fact that will vary from case to case, moreover, they have no precedential value for future cases and provide little useful guidance to shape the behavior of patentees and of other competitors.<sup>168</sup>

Statistics are not available on the social costs of evaluating equivalency to determine freedom to act or the need to license, and no good estimates of these costs exist. Common estimates of the costs of a law firm infringement opinion run from \$10,000 to \$100,000 per patent, and individual companies may need to evaluate hundreds of patents per year.<sup>169</sup> Overall costs of searching prior art and of assessing equivalency thus likely run hundreds of millions of dollars per year, although the costs may vary dramatically with the nature of the technology, the importance of the answer, and the resources of the entity and qualifications of the employees performing the evaluation.<sup>170</sup> Assuming that a patent is found to be valid

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167. See Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1502 (2001). These estimates exclude judicial and other non-party costs (and may exclude additional party costs, such as failed efforts at settlement or mediation).

168. See, e.g., *Orlaford Ltd. v. BBC Int'l, Ltd.*, 194 F.3d 1337, reported at 1999 U.S. App. LEXIS 9712, at \*10 n.3 (Fed. Cir. 1999) (For collateral estoppel to apply, "the controlling facts and applicable legal rules [must have been] the same in both actions."); *Insituform Techs., Inc. v. Cat Contracting, Inc.*, 161 F.3d 688, 692 (Fed. Cir. 1998) (doctrine of equivalents infringement is a question of fact); cf. *Pharmacia & Upjohn Co. v. Mylan Pharms., Inc.*, 170 F.3d 1373, 1379-82 (Fed. Cir. 1999) (applying collateral estoppel to claim invalidity).

169. See, e.g., Brief of Amicus Curiae Biotechnology Industry Organization in Support of Neither Party at 4, 7, *Knorr-Bremse Systeme Fuer Neutzfahrzeuge, GmbH v. Dana Corp.*, 383 F.3d 1337 (Fed. Cir. 2004) (en banc) (Nos. 01-1357, 01-1376, 02-1221, & 02-1256).

170. See, e.g., Federal Trade Commission Hearings, *Business Perspectives on Patents: Hardware & Semiconductors* (Feb. 28, 2002), available at <http://www.ftc.gov/opp/intellect/barrobert.doc> (testimony of Robert Barr, Cisco Sys.) (discussing the practical inability of companies to perform clearance searches, given the large number of potentially applicable patents); Federal Trade Commission—Department of Justice Antitrust Division Roundtable, *Competition, Economic, and Business Perspectives on Substantive Patent Law Issues: Non-Obviousness and Other Patentability Criteria*, at 80-81 (Oct. 30, 2002) [hereinafter FTC-DOJ Antitrust Division Roundtable] (testimony of Robert Barr, Cisco Sys.) (same), available at <http://www.ftc.gov/opp/intellect/021030>

and to apply, the average cost just to negotiate a single patent license has been estimated at \$50,000, and the number of patents that are licensed without litigation has been estimated at 3.5 percent of those issued each year (amounting to over 5,000 patents each year).<sup>171</sup> Presumably, a substantial percentage of the hundreds of millions of dollars spent in evaluations and of the estimated \$250 million spent negotiating patent licenses each year (assuming each patent is licensed only once, in the year it was issued) would be avoided if there were no modern doctrine of equivalents.

## 2. *Social Costs of Reduced Competition*

When the exclusive rights of a patent convey monopoly market power, patentees can prevent competitive substitutions and the public pays the costs of patent protection in the form of higher prices for and fewer beneficial alternatives to patented goods and services.<sup>172</sup> Valid and properly enforced patents therefore impose significant social costs. For this reason, substantial effort has been expended in trying to assess the optimal duration and scope of patent rights.<sup>173</sup>

Even when patents do not convey market power, patentees may exploit uncertainty regarding the scope of patents to deter competition by posing the threat of high-cost infringement litigation.<sup>174</sup> A very large percentage

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trans.pdf. These huge search and evaluation costs are prohibitive and may no longer be incurred in some industries, at least until a licensing request is made or litigation is threatened. *See* FTC-DOJ Antitrust Division Roundtable, *supra*, at 80-81 (testimony of Robert Barr, Cisco Sys.).

171. *See* Lemley, *supra* note 167, at 1507 n.55.

172. *See, e.g.*, Walker Process Equip., Inc. v. Food Mach. & Chem. Corp., 382 U.S. 172, 177-78 (1965) (discussing substitutability and monopoly); Kitch, *supra* note 77, at 122-23 (discussing designing around and relation of patent rights to market value and power). *See generally* John H. Barton, *Patents and Antitrust: A Rethinking in Light of Patent Breadth and Sequential Innovation*, 65 ANTITRUST L.J. 449 (1997); Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 J. LEG. STUDIES 247 (1994); Giles S. Rich, *The Relation Between Patent Practices and the Anti-Monopoly Laws*, 24 J. PAT. & TRADEMARK OFF. SOC'Y 85 (1942).

173. *See, e.g.*, WILLIAM D. NORDHAUS, INVENTION, GROWTH, AND WELFARE: A THEORETICAL TREATMENT OF TECHNOLOGICAL CHANGE §§ 5.3-5.5 (1969); Richard Gilbert & Carl Shapiro, *Optimal Patent Length and Breadth*, 21 RAND J. ECON. 106, 107-11 (1990); Paul Klemperer, *How Broad Should the Scope of Patent Protection Be?*, 21 RAND J. ECON. 113, 120-24 (1990); Joshua S. Gans & Stephen P. King, *Patent Length and the Timing of Innovative Activity*, at 2-4, 11-14 (July 1, 2004), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=560841](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=560841).

174. Injunctions to remove products from the market are rare. *See* Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, at 21 (July 14, 2004), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=567883](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=567883) (citing Carl A. Shapiro, *Antitrust Limits to Patent Settlements*, 34 RAND J. ECON. 391 (2003)). Nevertheless, decisions regarding

of patents asserted in litigation are found to be invalid.<sup>175</sup> Patentees thus routinely and improperly deter (or impose costly litigation on) their competitors. Litigation risks are increased (and competition is even more strongly deterred) by the threat of punitive treble damage awards and attorneys fees.<sup>176</sup> Patent holders also may extract value from their consumers by using their exclusive patents rights to impose “vertical restraints” on the use, transfer, or production of purchased products or licensed processes.<sup>177</sup>

The modern doctrine of equivalents expands the scope and increases the uncertainty of patent protection for each and every patent for its entire useful life. Accordingly, by decreasing competition and through extension

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whether to enter markets and to develop competing products may be dramatically affected by patent scope and infringement risks. *See, e.g.*, Merges & Nelson, *supra* note 60, at 884-908 (discussing effects of broad, pioneering patents on the development of various industries).

175. *See, e.g.*, *Decisions for 2002*, *supra* note 15 (In 2002, courts found claims that had been asserted in litigation to be invalid in ninety-nine of 238 cases, over forty percent; additionally, claims were found to be unenforceable for various reasons.); FTC REPORT, *supra* note 163, ch. 3, at 2-3, 33-46, 50-55 (discussing anti-competitive effects of large numbers of invalid patents); *id.* ch. 5, at 1-32 (discussing reforms to reduced the numbers of invalid patents); Lemley, *supra* note 167, at 1529 n.129 (estimating that forty-six percent of issued patents that are litigated are held invalid); Federal Trade Commission—Department of Justice Antitrust Division Roundtable, *Transcript* at 181-82, available at <http://www.ftc.gov/opp/intellect/021106ftctrans.pdf> (Nov. 6, 2002 testimony of Joseph Farrell, U. of Cal., Berkeley) (stating that incentives to challenge patents, particularly those asserted for licensing, are too weak).

176. *See* 35 U.S.C. §§ 284-285 (2000); FTC REPORT, *supra* note 163, ch. 5, at 28-31 (discussing the “disproportionally large in terrorem effect” of willful infringement provisions) (emphasis omitted); *see also* Knorr-Bremse Systeme Fuer Nutzfahrzeuge, GmbH v. Dana Corp., 383 F.3d 1337, 1344-47 (Fed. Cir. 2004) (removing adverse inferences of willful infringement relating to failure to disclose or obtain patent infringement opinions from legal counsel, but retaining duty of due care); Read Corp. v. Portec, Inc., 970 F.2d 816, 826-28 (Fed. Cir. 1992) (discussing factors to consider in determining willful infringement); *cf.* Seymour v. McCormick, 57 U.S. 480, 488-89 (1853) (stating that “there is no good reason why taking a man’s property in an invention should be trebly punished, while the measure of damages as to other property is single and actual damages”). *See generally* Matthew D. Powers & Steven C. Carlson, *The Evolution and Impact of the Doctrine of Willful Patent Infringement*, 51 SYR. L. REV. 53, 58-79, 99-112 (2001) (reviewing development and discussing effects of willful patent infringement doctrines).

177. *See, e.g.*, Michael J. Meurer, *Vertical Restraints and Intellectual Property Law: Beyond Antitrust*, 87 MINN. L. REV. 1871, 1874 (2003) (Vertical restraints should be analyzed to determine “whether IP law should aid a seller’s attempt to control: the economic life of a durable good; sharing of copyrighted works and patented technology; arbitrage that undermines price discrimination; or a user’s decision to exit the relationship.”) (footnotes omitted).

of vertical restraints, the modern doctrine results in higher costs to society for goods and services. Estimates of the total costs and lost benefits do not exist. However, the costs of expanded and increasingly uncertain patent protection generated by the modern doctrine plausibly dwarf the amounts spent directly on litigation, licensing, and infringement analyses.<sup>178</sup>

### 3. *Foregone Sequential Innovation*

The public pays the price of foregone (or delayed) sequential invention—and the goods and services developed therefrom—when potential sequential inventors are unwilling or unable to license the patented invention or to risk an infringement lawsuit.<sup>179</sup> As recently noted in a seminal study, “a forty year legacy of empirical findings in economics . . . calls into question whether patent protection—much less stronger patent protection—advances innovation in a substantial way in most industries.”<sup>180</sup> Further, patent thickets—or anti-commons—have been growing in many technological fields, preventing (or dramatically raising the costs of) access to needed technological inputs for sequential invention.<sup>181</sup>

The modern doctrine of equivalents makes the patent thicket thicker. By expanding the uncertainty of patent scope, the modern doctrine decreases the freedom of inventors to operate without licenses and increases

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178. Cf. Jonathan B. Baker, *The Case for Antitrust Enforcement*, 17 J. ECON. PERSP. 27, 42 (2003) (discussing why the benefits of protecting competition by antitrust enforcement “[a]lmost surely” exceed the costs).

179. See Lemley, *supra* note 77, at 1005-10 (discussing effects of patent rights on sequential invention). This is true without regard to the actual likelihood that patents would be found to apply to the relevant activities.

180. 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. W7552, 2000), available at <http://www.nber.org/papers/w7552>.

181. See, e.g., FTC REPORT, *supra* note 163, ch. 3, at 26-29, 30-43, 44-56 (discussing patent thickets and anti-commons issues in the biotechnology, computer hardware, and computer software and internet industries); Lemley & Shapiro, *supra* note 174, at 12-13, 16 (discussing the “negative consequences on third parties” of continuation patent practice and patent thickets in regard to competition and innovation, and noting arguments that the costs to society of unasserted and likely invalid patents are sufficient to warrant greater efforts to weed them out) (citing Nancy T. Gallini, *The Economics of Patents: Lessons From Recent U.S. Patent Reform*, 16 J. ECON. PERSP. 131 (2002), and Jay Kesan & Shubha Ghosh, *What Do Patents Purchase? In Search of Optimal Ignorance in the Patent Office*, 40 HOUS. L. REV. 1219 (2004)). See generally Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698 (1998); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting* (March 2001), available at <http://faculty.haas.berkeley.edu/shapiro/thicket.pdf>.

the ability of patentees to threaten infringement. More patents need to be evaluated for their potential application and for the chilling effect on competition that results when the application is extended. As the Supreme Court recognized in *Markman v. Westview Instruments, Inc.*, “a ‘zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention only a little less than unequivocal foreclosure of the field.’”<sup>182</sup> The modern doctrine thus creates substantial opportunity costs of foregone innovation, which would be avoided if the scope of patents were narrower and more certain.

These opportunity costs of the modern doctrine are of particular concern in light of recent changes in patenting and licensing behaviors<sup>183</sup> and of the Federal Circuit’s recent holding in *Madey v. Duke University*.<sup>184</sup> Substantial evidence points to increasing licensing holdups, litigation threats, and “defensive” patent acquisition meant to assure cross-licensing and prevent infringement threats.<sup>185</sup> In such cases, the patent system operates only as a tax on innovation.<sup>186</sup> In *Madey*, the Federal Circuit held that

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182. 517 U.S. 370, 390 (1996) (citation omitted).

183. See, e.g., John H. Barton, *Antitrust Treatment of Oligopolies with Mutually Blocking Patent Portfolios*, 69 ANTITRUST L.J. 851, 853-57, 870-73 (2002) (discussing licensing holdups and anti-competitive patent pools); Marina Lao, *Unilateral Refusals to Sell or License Intellectual Property and the Antitrust Duty To Deal*, 9 CORNELL J.L. & PUB. POL’Y 193, 202-06, 217-18 (1999) (discussing unilateral refusals to license); Arti K. Rai, *Fostering Cumulative Innovation in the Biopharmaceutical Industry: The Role of Patents and Antitrust*, 16 BERKELEY TECH. L.J. 813, 845-853 (2001) (discussing licensing holdups that prevent subsequent research); Mildred K. Cho et al., *Diagnostic Testing Fails the Test: The Pitfalls of Patents are Illustrated by the Case of Haemochromatosis*, 415 NATURE 577, 577-79 (2002) (discussing unilateral refusals to license patented diagnostics for scientific research); James Bessen, *Patent Thickets: Strategic Patenting of Complex Technologies*, at 4 (March 2003) (discussing licensing holdups), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=327760](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=327760). Theoretically, some degree of licensing holdups may be unavoidable, at least for sequential inventions that rely on private knowledge not held by the patentee. See generally James Bessen, *Holdup and Licensing of Cumulative Innovations With Private Information*, 82 ECON. LETTERS 321 (2004).

184. 307 F.3d 1351 (Fed. Cir. 2002)

185. See, e.g., COHEN ET AL., *supra* note 180, at 9-11, 22-24, tbls. 1, 10-11 (surveying the perceived importance of patents and other means of protecting innovations, including secrecy and lead time advantage, for a range of industries and noting differences among and within industries).

186. See, e.g., FTC REPORT, *supra* note 163, at 6 (discussing effects of increasing defensive patenting); COHEN ET AL., *supra* note 180 at 27 (noting the decreased social value of patenting resulting from the “overhead of defensive patenting”) (quoting ERIC VON HIPPEL, *THE SOURCES OF INNOVATION* 53 (1988)). Even when patents serve to induce investment, invention, and disclosure, licensing acts as a tax on sequential innovation.

the historic experimental use exception to infringement is very narrow, and is not available to universities for research using patented inventions that furthers the economic business of education.<sup>187</sup> The Federal Circuit's holding in *Madey* is likely to increase the perceived need for licensing in research and thus further increase the tax on innovation.<sup>188</sup>

Given the complexity of factors that affect innovation, it would be very difficult to estimate the amount and social cost of foregone innovation resulting from the modern doctrine of equivalents.<sup>189</sup> Knowledge accumulates over time. Thus, the cost of foregone future innovation is likely to dramatically exceed the already large current costs of reduced competi-

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187. See 307 F.3d at 1361-63.

188. See John P. Walsh, et al., *Effects of Research Tool Patents and Licensing on Biomedical Innovation*, in PATENTS IN THE KNOWLEDGE-BASED ECONOMY 285, 335-36 (Wesley M. Cohen & Stephen A. Merrill eds. 2003) (noting holdups in specific areas and expressing concern that the lack of widespread problems before *Madey*—based on “working solutions” that included infringement, often by invoking an informal claim to an experimental use exception—may not continue). Whether the Federal Circuit's interpretation of the scope of the experimental use exception was correct is beside the point, except as it may affect the likelihood that the narrow interpretation will be reversed by the Supreme Court or Congress. See, e.g., NAT'L RESEARCH COUNCIL, NAT'L ACAD. OF SCI., A PATENT SYSTEM FOR THE 21ST CENTURY 88-95 (Stephen A. Merrill et al. eds., 2004) (recommending legislative or administrative action to revise the *Madey* decision).

189. See, e.g., John R. Allison & Mark A. Lemley, *The Growing Complexity of the United States Patent System*, 82 B.U. L. REV. 77, 141 (2002) (“The scholarly effort to explain what drives innovation has been long and complex.”); Scotchmer, *supra* note 83, at 37 (“There are no simple conclusions to draw about optimal breadth of patents.”); Paroma Sanyal & Adam B. Jaffe, *Peanut Butter Patents Versus the New Economy: Does the Increased Rate of Patenting Signal More Invention or Just Lower Standards?*, at 7 (April 2004), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=556630](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=556630) (discussing factors that affect invention rate, including research and development expenditures, “income, education, government quality and the legal environment of a country,” as well as intellectual property regimes). Most of the existing studies and theoretical models analyze and find heterogeneity in approaches to protecting innovation or patenting behaviors, rather than isolate the effects of patents on sequential innovation. See, e.g., Allison & Lemley, *supra*, at 81-87 (surveying the literature); John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 438-39 (2004) (noting characteristics of litigated patents). The converse of heterogeneity in innovation is heterogeneity in the costs of patents to sequential innovation. Cf. Lunney, *supra* note 163, at 42-46 (noting that the desirability of expanded protection requires balancing additional induced creative output with reduced abilities to exploit “the nonrivalrous character of the preexisting products,” that perfect information and costlessly enforceable legal rules do not exist to allow the balance to be set for each innovative product, and that uniform protection may prevent maximizing social welfare). Patent rules also change over time, which may further affect the scope of foregone innovation. See Gans & King, *supra* note 173, at 2-4, 11-14 (discussing how patent scope and duration may have different impacts on the timing of innovative activities).

tion that the modern doctrine imposes.<sup>190</sup> Although these opportunity costs are likely to be the most substantial, and thus should pose the gravest concerns, they may be the least salient for policy makers because they are less certain and will be incurred in the future.<sup>191</sup>

## B. Purported Benefits and the Cost-Benefit Imbalance

The Supreme Court has implied that the modern doctrine of equivalents provides social benefits by encouraging investment in and disclosure of pioneering inventions with uncertain future applications. Such inventions allegedly would not occur without protection against later-arising competitive equivalents and improvements.<sup>192</sup> Absent equivalents protection for “insubstantial modifications that amount to little more than fraud on the patent,” the incentive for competitors to make only minor improvements increases. The “value of pioneering inventions, and the incentive to produce them, are substantially diminished by would-be inventors’ concerns that their rights will be immediately diluted . . . [by] insubstantial changes and . . . mere copies.”<sup>193</sup>

There is *no* empirical evidence that the modern doctrine of equivalents provides *any* such social benefits. Specifically, there is no evidence that the modern doctrine actually affects *ex ante* decision making, and it is unclear that society would benefit if it did. Because evidence does not exist to demonstrate that the modern doctrine produces net (or only) welfare losses, the argument proceeds conceptually.

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190. Cf. Merges & Nelson, *supra* note 60, at 877-78 (“[W]e are much better off with considerable rivalry in invention than with too little . . . [W]hen it comes to invention and innovation, faster is better.”).

191. See, e.g., DANIEL KAHNEMANN ET AL., JUDGMENT UNDER UNCERTAINTY 163-201 (1982) (discussing availability heuristics); Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 91 COLUM. L. REV. 941, 945-47 (1999) (discussing the differences in environmental regulatory benefit evaluations resulting from applying discount rates). See generally Cass R. Sunstein, *Which Risks First?*, 1997 U. CHI. LEGAL. F. 101 (1997) (discussing psychological factors and institutional arrangements that affect private evaluations and public decisions regarding personal and social costs).

192. See *supra* notes 100-01 and accompanying text; Warner Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 27 n.4 (1997) (noting historic judicial recognition of pioneering patents in the context of rejecting arguments that the doctrine of equivalents conflicts with the transition to a peripheral claiming system).

193. Matthew J. Conigliaro et al., *Foreseeability in Patent Law*, 16 BERKELEY TECH. L.J. 1045, 1059 (2001); cf. *id.* at 1063 (“The absolute bar [for prosecution history estoppel] also threatens to eliminate the incentive to produce socially valuable pioneering inventions.”).

Michael Meurer and Craig Nard recently have suggested that the modern doctrine may induce pioneering invention and prevent social welfare losses from unwarranted claim refinement expenditures during prosecution.<sup>194</sup> However, as discussed below, the actual expectations of investors, inventors, and patent lawyers are unlikely to correspond to the economic rationality of the models that Meurer and Nard have helpfully provided. Further, James Bessen has suggested that (except in technologies having low imitation costs) granting patent rights in general may delay rather than foster the diffusion of the technical information.<sup>195</sup> By extension, expanding patent rights under the doctrine of equivalents also may do more harm than good. But even if the modern doctrine in some circumstances did prevent wasted claim refinement or did encourage investment, invention, or disclosure having a positive social value, the costs of implementing the modern doctrine would likely outweigh those benefits.<sup>196</sup> The net effects of the modern doctrine are particularly likely to decrease social welfare to the extent that patent law remains uniform by technology and by type of invention.<sup>197</sup>

1. *Lack of Encouragement for Investment, Invention, and Disclosure*

In theory, the modern doctrine cannot provide any static incentives for socially beneficial investment, invention, and disclosure, because it applies to issued patents only after *ex ante* (to patenting) decisions have been

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194. See Meurer & Nard, *supra* note 81, at 5 (defining claim refinement as “the process of identifying and claiming the broadest patentable set of embodiments enabled by the disclosure in the patent specification”); *id.* at 38-39 (noting that pioneering inventions should not receive a “double reward” from equivalents protection when refinement costs are low; and noting that, depending on patentee refinement costs and competitor development costs, the doctrine of equivalents may prevent wasteful preemptive refinement or socially valuable imitation).

195. See James Bessen, *Patents and the Diffusion of Technical Information*, at 8-9 (March 2004), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=517024](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=517024).

196. See Meurer & Nard, *supra* note 81, at 6 (recognizing that “socially optimal patent policy should balance refinement cost savings and innovative incentives created by the [doctrine of equivalents] against the harm to competition and rent-seeking costs created by the doctrine”). See generally Colin S. Diver, *The Optimal Precision of Administrative Rules*, 93 YALE L.J. 65, 71-79 (1983) (discussing conditions for optimal precision of legal standards).

197. See Lunney, *supra* note 163, at 69-71 (noting the desirability of tailoring patent scope “for a particular innovation” so as to better match economic rents to reservation costs). *But see id.* (suggesting that the modern doctrine of equivalents provides greater opportunities than claim interpretation to perform such tailoring). See generally Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155 (2002).

made. Dynamically, the modern doctrine can provide benefits only by insuring against claim-drafting errors (in regard to equivalents that validly could have been claimed) and by extending patent protection to unclaimable equivalents. To avoid dedication or disclaimer, equivalents erroneously excluded from the claims and unclaimable equivalents must be unforeseeable. If they were predictable, the claim's errors or limitations should have been corrected and the unclaimable equivalents should have been developed to the point they became claimable and disclosed.<sup>198</sup> Making the modern doctrine available to redress unforeseeable drafting errors and unclaimable equivalents thus is unlikely to affect *ex ante* decision making,<sup>199</sup> except by providing a vague (but typically mistaken) sense that equivalents protection may be available to block competitors in the event that such errors or later technological developments are discovered.<sup>200</sup>

Further, in most (if not all) cases, errors in failing to claim equivalents actually reflect strategic decisions in prosecuting patents rather than failures of judgment. Whether drafting an original claim or adopting narrowing amendments or arguments, patentees have incentives to intentionally claim less than the full scope of patentable subject matter they disclosed. These incentives include improving the chances of successful or quicker prosecution, protecting against unknown prior art or other validity chal-

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198. See *supra* notes 145-47 and accompanying text.

199. Meurer and Nard evaluate claim refinement and development with regard to expenditures and economic incentives. See, e.g., Meurer & Nard, *supra* note 81, at 6 n.26 (distinguishing refinement from development costs); *id.* at 7-8 (describing effects of "incentive[s] to inventors" when refinement costs are "high" and "low"). However, these factors are more appropriately analyzed in terms of patent lawyers' and inventors' perceptions and expectations, because people act based on these factors whether or not they correspond to economic rationality. Cf. Sunstein, *supra* note 191, tbl. 6 (listing various heuristics that affect perception and judgment and lead people to incorrectly assess environmental risks); *id.* tbl. 7 (listing "qualitative variables" that affect personal judgments and make them differ from more "objective" expert assessments). The conclusion that the costs of the modern doctrine outweigh the benefits is unlikely to change even if people were to act as economic theory predicts they should.

200. See *supra* notes 166, 175 and accompanying text. Such *ex ante* evaluations of the likelihood and benefits of such future protection differ from *ex post* decisions to assert equivalents claims, which may take into account case-specific information. It seems intuitively probable that the litigation statistics reflect a higher rate of success (when the costs of litigation were found to be justified) than would *ex ante* predictions. However, the *ex ante* predictions of the value of asserting equivalents protection could be higher if successful, bad-faith assertions of equivalents protection occur that are not reflected in litigation statistics. See, e.g., *Golan v. Pingel Enters.*, 310 F.3d 1360, 1370-73 (Fed. Cir. 2002) (discussing unfair competition claims for bad faith assertion of patent claims).

lenges, and minimizing the costs of prosecution.<sup>201</sup> Under-broad claims that actually result from true (and excusable) mistakes of legal judgment or in selecting claim drafting language thus may be relatively rare, although lack of foresight regarding later-arising technologies or lack of investment of adequate resources in high-quality prosecution may be common.<sup>202</sup> Patentees should not be entitled to additional protection under the modern doctrine when they strategically failed to claim such protection.<sup>203</sup> Absent strategic decision making, moreover, no rational patent lawyer or client would knowingly forego literal claim scope in favor of equivalents protection.<sup>204</sup>

The modern doctrine of equivalents thus operates principally as an insurance policy against potential but unrecognized mistakes in drafting or against potential but unforeseeable developments in technology. Such errors or later-arising technologies may diminish the future market for the patented technology, thereby preventing recoupment of earlier investments and validation of earlier decisions to invent or to disclose. However, there is no empirical evidence that anyone has actually relied on this insurance in making any *ex ante* investment, invention, and disclosure decisions. Given the current, relatively low levels of importance attached to protecting innovation through patents for most industries, such reliance seems

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201. In particular, patents may frequently fail to claim the full scope of disclosed, patentable invention because patentees sought to reduce the high costs of attorney fees and inventor time. *See, e.g., In re Wilder*, 736 F.2d 1516, 1519 (Fed. Cir. 1984) (“An attorney’s failure to appreciate the full scope of the invention is one of the most common sources of defects in patents.”); F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules*, 45 B.C. L. REV. 55, 101-02 (2003) (noting intentionally varying expenditures on prosecution based on perceived importance of the invention). Although such failures may not reflect an intentional choice to claim less than full patentable scope, such penny-wise and pound-foolish prosecution strategies are consciously adopted and should not be considered drafting “errors.” *Cf. Meurer & Nard, supra* note 81, at 23 (noting that the modern doctrine “should not offer routine relief for mistakes because such a policy undercuts the incentive . . . to invest in a high quality application and ignores the statutory reissue provision”).

202. *See, e.g., Conigliaro, supra* note 193, at 1069-71 (discussing examples of situations where later-arising technological equivalents would not be objectively foreseeable) (citing *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558, 619 (Fed. Cir. 2000) (en banc) (Rader, J., dissenting), *rev'd*, 535 U.S. 727 (2002), and *Lockheed Martin Corp. v. Space Sys./Loral, Inc.*, 249 F.3d 1314, 1326-27 (Fed. Cir. 2001)).

203. *See supra* notes 92-95 and accompanying text.

204. *Cf. Jeremy T. Marr, Foreseeability as a Bar to the Doctrine of Equivalents*, at 13-15 (May 20, 2003) (noting that providing protection for foreseeable equivalents of unamended claims would penalize patentees for initial broad claiming), *available at* <http://ssrn.com/abstract=410027>.

highly unlikely (or at least highly nonuniform).<sup>205</sup> There is also no evidence that this doctrinal insurance policy has actually paid out for anyone who did in fact rely on the existence of the modern doctrine when making investment, invention, or disclosure decisions that would not otherwise have occurred. Thus, there is no evidence that the modern doctrine has had any socially beneficial effect, although it is clear that the modern doctrine in a small percentage of cases has shifted wealth from competitors and the public to patentees.

Another way to assess the benefits of the modern doctrine of equivalents is to evaluate the social costs of foregone investment, invention, and disclosure that would result from abolishing it. Substantial evidence points to the increasingly weak incentives that patents provide relative to other mechanisms for protecting innovations and investments, even though patent protection may be important to particular technology sectors (such as the pharmaceutical and software industries).<sup>206</sup> Narrowing patent scope “at the margin” by eliminating the modern doctrine may not lead to any, much less to a significant, change in incentives for investment in and invention and disclosure of pioneering inventions, because pioneering inventions normally provide higher returns than improvement inventions and have substantially greater scope.<sup>207</sup> In summary, it is unlikely that the modern doctrine provides any benefits. If it does those benefits are likely to be very small.<sup>208</sup>

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205. See COHEN ET AL., *supra* note 180, at 14-15 (discussing firms’ beliefs that patent protection may be ineffective to protect technological innovations); *id.* at 9 (summarizing firm beliefs regarding relative effectiveness of patents and other appropriation mechanisms, and noting patents’ “subordinate role in the preponderance of industries”). To rely on such an insurance policy also might be irrational, given the low rates of success proving equivalents infringement in litigation. See *supra* note 166 and accompanying text. However, it is not possible here to perform a cost-benefit analysis of the potential for success and value of asserting equivalents protection.

206. See, e.g., F.M. SCHERER, *INDUSTRY STRUCTURE, STRATEGY, AND PUBLIC POLICY* 361-62 (Harper Collins 1996) (citing Richard Levin, et al., *Appropriating the Returns from Industrial Research and Development*, BROOKINGS PAPERS ON ECON. ACTIVITY 783-820 (1987)) (surveying the perceived importance of patents and other means of protecting innovations, including secrecy and lead time advantage, for a range of industries and noting differences among and within industries); COHEN ET AL., *supra* note 180, at 9-11, tbls. 1, 10-11 (same).

207. *Merges & Nelson*, *supra* note 60, at 878 n.163. Given the dramatic increase in patentable scope for pioneering inventions that has already occurred over the last two centuries, such disincentives seem even more unlikely. See *supra* notes 58, 159 and accompanying text.

208. Cf. *Meurer & Nard*, *supra* note 81, at 8-9 (stating that refinement costs may be counter-intuitively low for claiming later-arising technologies and noting three existing limitations on the modern doctrine of equivalents—the all-elements rule, dedication, and

## 2. *Cost-Benefit Analysis and Abolishing the Doctrine*

The net social benefits of providing broader pioneering patent scope—and by extension, any benefits that might result from the increased scope of patent protection provided by the modern doctrine of equivalents—are highly dependent on the degree to which the patent rights are exploited and improved by the patent holder and coordinated with competitive improvers through licensing.<sup>209</sup> Even if some benefits resulted from increased investment, invention, or disclosure of pioneering inventions or from reduced wasteful claim refinement, they are likely to be relatively small. Thus, the modern doctrine would likely be inefficient because of the high direct costs of litigation, licensing, and assessment and because of imperfections in patent licensing and litigation markets. Further, even if net benefits would nonuniformly result for particular inventions, the modern doctrine is likely to be inefficient overall, based on the net costs for other inventions.<sup>210</sup>

Given the likelihood that the modern doctrine of equivalents imposes only costs or imposes substantial net costs, it should be abolished wholesale. But it would still be preferable to the current state of affairs to amend the modern doctrine, limiting its retail application by taking into explicit consideration for each patent “refinement cost savings . . . inventor profit and the incentive to invent.”<sup>211</sup> Because the modern doctrine already applies to every issued patent and frequently requires uncertain and costly evaluations by patentees, the public, and courts, there would be very little incremental cost to providing such a nonuniform doctrinal approach.<sup>212</sup>

Finally, the ability to obtain a broadening reissue patent and to pursue legal malpractice claims provides a more appropriate remedy than the modern doctrine for equivalents that could have been but were not validly

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prosecution history estoppel—that reflect low refinement costs). Patents rarely issue without generating some prosecution history that is relevant to later litigation asserting the modern doctrine, which is one reason why doctrine of equivalents issues so frequently are decided against patentees. *See supra* notes 166, 175, 200 and accompanying text. The overall incidence of cases where the modern doctrine could be thought to provide net benefits thus should be low.

209. *See, e.g.*, Merges & Nelson, *supra* note 60, at 871-78, 882-83, 893-98, 903-07; *see also* Lemley, *supra* note 77, at 1052-67 (discussing licensing problems and market power concerns that affect improvement innovations).

210. The costs also may be more salient for policy makers (if not to patentees). *See supra* note 191.

211. Meurer & Nard, *supra* note 81, at 46.

212. *See* Lunney, *supra* note 163, at 78 (discussing the tradeoffs created by uniform patent standards between the increased social value of additional protection and the reduced social value of unnecessary protection).

claimed. Broadening reissues must be sought within two years, which protects the public's reliance interests in the original claims.<sup>213</sup> The patentee, in theory, is adequately protected by a malpractice action if a claim drafting error or lack of foresight regarding later-arising technologies departs from accepted standards for patent prosecution practice, and such protection is provided without imposing third-party harms on the public.<sup>214</sup> Given the social costs of the modern doctrine, there is no sufficient utilitarian or deontological justification for protecting equivalents that the patentee did not or could not claim.

## V. THE UNNECESSARY SUBSTANTIVE AND PROCEDURAL COMPLEXITY OF THE MODERN DOCTRINE

The modern doctrine of equivalents necessarily expands and renders patent scope more uncertain than claim interpretation. As discussed above, equivalents protection is additive to the scope of application of construed claim language, and is restricted only by a vague vitiation standard that effectively extends, but remains tethered to, that language. Although factual similarity judgments may in some cases approximate legal limits on the scope and application of claims—including pioneering patent scope limitations and dedication and implied disclaimers—construction and application and equivalency determinations are conceptually distinct.<sup>215</sup>

The Supreme Court's new vitiation standard for the modern doctrine of equivalents is particularly problematic because it lacks both historical ties to and theoretical resolution of the basic policy issues. To determine vitiation, courts are required to construe claim language and to evaluate that language in light of patent law policies. But these policies apply to determining meaning and validity of claims for direct application in the first instance, and provide no immediate help in assessing the extent to

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213. Cf. Martin J. Adelman & Gary L. Francione, *The Doctrine of Equivalents in Patent Law: Questions that Pennwalt Did Not Answer*, 137 U. PENN. L. REV. 673, 715-28 (1989); Janicke, *supra* note 33, at 39-48 (suggesting eliminating the modern doctrine, extending the time for reissues, and expanding intervening rights). *But cf.* Meurer & Nard, *supra* note 81, at 43 (recommending preservation of the modern doctrine for pioneering inventions that are commercialized after the two-year limit for broadening reissue patents).

214. See, e.g., A. Samuel Oddi, *Patent Attorney Malpractice: An Oxymoron No More*, U. Akron Sch. of Law Pub. Research Paper, No. 03-13, at 13 (2003) (unpublished manuscript on file with the author) (noting that "at least three times the number of malpractice cases against patent attorneys have been decided in the past 14 years compared to the first 200 years of our federal patent system"). Legal malpractice claims, however, would not be available for *pro se* or in-house claim drafters.

215. See *supra* notes 34-49, 106-29 and accompanying text.

which penumbral equivalents protection should be limited after extension beyond the scope of application of construed claim language. As Lord Hoffman of the United Kingdom recently noted, “once the monopoly ha[s] been allowed to escape from the terms of the claims, it is not easy to know where its limits should be drawn.”<sup>216</sup> Lacking any theoretical guidance, American courts have reached results without providing the patentee or the public an adequate explanation of their reasoning.<sup>217</sup> Although the Court assured that claim construction remains the alpha and omega for determining patent scope, it failed to provide the terminology to discuss (or a standard to assess) when claim limitations would be stretched too far.

After *Graver Tank* and *Warner-Jenkinson*, patent scope determinations resemble a visit to the Mad-Hatter’s tea-party, going around the table just to get back to the beginning and come up theoretically empty.<sup>218</sup> Assuming there is no literal infringement, judges must: (1) initially construe claims by considering claim-language and claim-scope doctrines; (2) determine whether the specification and claims dedicate equivalents or whether the prosecution history estops equivalents protection; (3) determine as a matter of law whether to direct a verdict of equivalents infringement; (4) if factual issues remain, hold a jury trial, and then determine whether a jury’s findings regarding factual equivalency lack support (considering the additional evidence adduced at trial); and (5) decide whether equivalents protection would entirely vitiate the claim limitation that defines the level of generality of the invention and that did not directly apply to the allegedly infringing product or process. The question for vitiation is ultimately the same as for construction, that is, the extent to which the objective meaning of the claim language will govern a patent’s scope of application.<sup>219</sup> As a result, “American patent litigants will pay

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216. *Kirin-Amgen, Inc. v. Hoechst Marion Roussel Ltd.* [2004] U.K.H.L. 46, ¶ 39 (H.L. Oct. 21, 2004), available at <http://www.parliament.the-stationery-office.co.uk/pa/ld200304/ldjudgmt/jd041021/kirin-1.htm>.

217. See *supra* note 128 and accompanying text.

218. See LEWIS CARROLL, *THE ANNOTATED ALICE: ALICE’S ADVENTURES IN WONDERLAND & THROUGH THE LOOKING GLASS* 99 (Gardner ed. 1960) (“‘Then you keep moving round, I suppose?’ said Alice. ‘Exactly so,’ said the Hatter: ‘as the things get used up.’ ‘But what happens when you come to the beginning again?’ Alice ventured to ask. ‘Suppose we change the subject,’ the March Hare interrupted, yawning. ‘I’m getting tired of this.’”).

219. See *id.* at 269 (“‘When I use a word,’ Humpty Dumpty said in rather a scornful tone, ‘it means just what I choose it to mean—neither more nor less.’ ‘The question is,’ said Alice, ‘whether you *can* make words mean so many different things.’ ‘The question is,’ said Humpty Dumpty, ‘which is to be master—that’s all.’”).

dearly for results which are no more just or predictable than could be achieved by simply reading the claims.”<sup>220</sup>

The Supreme Court has offered no reason—much less a compelling one—to exchange the historic claim-language and claim-scope doctrines that defined the scope of patent protection for the substantive and procedural Wonderland of the modern doctrine of equivalents. But if any additional protection beyond the scope of application of the literal meaning of claim limitations were thought to be necessary, nonliteral claim construction should be a preferable alternative to the modern doctrine. This is the approach recently adopted by the United Kingdom, requiring “purposive construction” as an alternative to “literalism,” in order to give “fair protection to the patentee.”<sup>221</sup> The facts of the *Festo* case provide a concrete example of why literal interpretation should be preferred, and why nonliteral interpretation would be a better alternative than the modern doctrine to remedy (mistakenly) perceived unfairness.

#### A. Substantive and Procedural Concerns

The theoretical and economic analyses of Parts III and IV demonstrate that—as a matter either of fairness or of efficiency—patentees should be held to the scope of application of the literal meaning of construed claims, whether those claims are construed liberally or narrowly. The following analysis thus proceeds on the mistaken belief that some additional scope of patent protection is sometimes warranted. In such cases, nonliteral claim construction should be preferable to the modern doctrine of equivalents as a remedy for the purportedly inadequate literal scope of patent protection. There are at least three reasons to prefer nonliteral interpretation to the modern doctrine.

First, nonliteral claim construction remains subject to doctrinal limits. These claim-language and claim-scope doctrines restrict expansive nonliteral interpretations when such expansive protection would conflict with policies intended to assure the proper functioning of the patent system. In contrast, these doctrines do not directly apply to decisions under the modern doctrine, and courts must develop patent scope policies indirectly (if at all) under the theory-impaired vitiation standard.

Second, nonliteral claim construction would likely result in narrower expansion of patent scope than would application of the modern doctrine of equivalents. If expansion of patent scope is not needed to achieve fairness or efficiency, then less expansive extensions of patent protection are

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220. *Kirin-Amgen*, [2004] U.K.H.L. 46, ¶ 44.

221. *Id.* ¶¶ 34-35, 42.

to be preferred. Nonliteral constructions also should better reflect the fair scope of actual patentee contributions to the art and utilitarian incentives in the art, because these *ex ante* contributions and incentives cannot vary with the equivalents at issue in *ex post* litigation.<sup>222</sup>

Finally, compared to the modern doctrine of equivalents, nonliteral construction reduces procedural complexity, minimizes the costs of administering expanded patent scope, and retains more appropriate roles for judges and juries.<sup>223</sup> By treating the expanded scope of protection as a question of fact for juries, the modern doctrine complicates the timing and nature of, and alters the applicable standards of review accorded to, the relevant legal and factual judgments. In contrast, nonliteral construction should prevent juries and limit judges from improperly considering patent scope policies without adequate guidance, and should minimize consideration of fairness concerns (such as the patentees' or the accused infringer's conduct) that are irrelevant to patent scope judgments.<sup>224</sup>

### 1. *Statutory Conflicts and Doctrinal Limitations*

Serious concerns have long been raised about the modern doctrine of equivalents and the uncertain scope of patent protection that it engenders. As Judge Learned Hand recognized, to determine patent scope from the disclosure in the specification rather than from the claims would conflict with critical provisions of the Patent Act. Finding infringement for factual equivalents that are not claimed embodiments thus: (1) violates the principle that the unclaimed portions of the disclosure are dedicated to public use; (2) requires courts to substitute for the Patent Office in examining claims and to construct hypothetical claims drafted with hindsight (or perfect foresight) that might be found valid, contrary to existing doctrine; and (3) places an "intolerable burden on the public" to discern the relevant art

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222. *Cf. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 736 (2002) (distinguishing "the patentee's reason for making the amendment [from] the impact the amendment has on the subject matter"); *Festo*, 234 F.3d 558, 574-78 (Fed. Cir. 2000) (en banc) (weighing perceived social benefits and costs of a flexible bar to prosecution history estoppel, and concluding that a complete bar is preferable). *But cf. Festo*, 234 F.3d at 620-21 (Linn, J., concurring-in-part and dissenting-in-part) (arguing for a flexible bar based on the perceived need for strong patent protection to encourage "innovation, economic growth, and American competitiveness").

223. *But cf. Rai*, *supra* note 109, at 1059 (arguing that *de novo* review of claim construction "has had something of a 'domino effect,' leading the court to arrogate power over issues even it admits are largely factual, such as infringement").

224. *See supra* note 79 and accompanying text. *But cf. Festo*, 234 F.3d at 600 (Michel, J., concurring-in-part and dissenting-in-part) (discussing "would-be copyists" who would "exploit" a complete bar to equivalents under prosecution history estoppel); *supra* note 78 and accompanying text.

prior to the application and to determine how much room was left for the inventor's invention.<sup>225</sup> The doctrine of equivalents also may protect a broader range of products or processes than the patentee (4) invented, (5) sought to protect, (6) disclosed, or (7) enabled for public use,<sup>226</sup> rendering the scope of patent protection inefficient.

Although the Supreme Court in *Warner-Jenkinson* rejected arguments that the modern doctrine was invalid based on conflict with the first three statutory requirements identified above,<sup>227</sup> the Court has not squarely addressed conflicts with the invention, regards-as-invention, written description, and enablement requirements. Even if the Court were to uphold the modern doctrine when considering these additional doctrinal limits, the modern doctrine should nevertheless be subservient to those limits. As recognized by the Federal Circuit in regard to prior art, the modern doctrine should not protect what the patentee could not validly claim.<sup>228</sup>

The modern doctrine of equivalents, however, is not subservient to but rather conflicts with the claim-language and claim-scope doctrines that define the patent property right. The modern doctrine provides no guidance for judges (much less juries) to assess the fairness or efficiency of protecting equivalents beyond claim scope in particular cases. Rather, such judgments (if made at all) are unlikely to be articulated by judges or juries and are likely to reflect either innate beliefs regarding the value of patents or prejudice against the particular parties.<sup>229</sup> Even if the theoretical

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225. *Claude Neon Lights, Inc. v. E. Machlett & Son*, 36 F.2d 574, 575-76 (2d Cir. 1929); see *Festo*, 535 U.S. at 734 (discussing the "PTO's gatekeeping role"); *id.* at 737 (stating that flexible recapture of equivalents "leads to excessive uncertainty and burdens legitimate innovation"); *Warner Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 28-29 (1997) ("There can be no denying that the doctrine of equivalents, when applied broadly, conflicts with the definitional and public-notice functions of the statutory claiming requirement."). Further, to the extent it withdraws inventions already within the public domain, the doctrine conflicts with basic premises of the patent power. See *supra* note 49 and accompanying text.

226. See 35 U.S.C. §§ 102(f), 112 ¶¶ 1, 2 (2000); *supra* note 52 and accompanying text.

227. See *Warner-Jenkinson*, 520 U.S. at 24-30; *supra* note 25 and accompanying text. Given the relevant history, the Court's decision was wrong and should be revisited by the Court or Congress.

228. See *supra* note 50 and accompanying text.

229. See, e.g., Rochelle C. Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1, 26-30 (1989) (evaluating whether the Federal Circuit has a pro-patent bias); Allan N. Litmann, *Restoring the Balance of Our Patent System*, 37 IDEA 545, 552-70 (1997) (arguing that the Federal Circuit has a pro-patent bias); Kimberly A. Moore, *Populism and Patents*, abstract, *George Mason Law & Econ. Research Paper No. 04-30* (July 2004), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=566942](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=566942) (discussing "anti-corporate prejudice" that affects patent

criteria could be articulated, it is unlikely that juries would be capable of properly making the required judgments about how to apply the relevant patent law policies.<sup>230</sup> As a result, the modern doctrine of equivalents and the vitiation standard are unlikely to lead to more rational development and application of patent-scope doctrines. In contrast, by applying nonliteral claim construction, judges can directly and more appropriately take these considerations into account.

## 2. *More Limited Claim Expansion by Nonliteral Interpretation*

Even without regard to doctrinal limits, courts are more likely to provide patentees with narrower protection through nonliteral claim interpretation than under the modern doctrine of equivalents. Nonliteral claim construction must centrifugally expand the boundaries of claim meaning. It is therefore more likely to result in under-inclusion of potential scope when expansion of literal meaning is (mistakenly) thought to be needed.<sup>231</sup> In contrast, factual equivalency determinations under the modern doctrine

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litigation). Specific verdict forms requiring juries to explain their reasoning for finding equivalency would likely impermissibly interfere with acceptable standards for secrecy of jury deliberations. *See, e.g.*, *Chaffin v. Stynchcombe*, 412 U.S. 17, 41 (1973) (requiring post-sentencing inquiry of jury decisions “could be achieved only by sacrificing the traditional secrecy of jury deliberations”); Carl H. Coleman, *Rationalizing Risk Assessment in Human Subject Research*, 46 ARIZ. L. REV. 1, 18 n.103 (2004) (discussing how the norms for secrecy of jury deliberation preclude “any effective scrutiny of the decision making process” and how faulty performance is hidden by jury secrecy rules “allowing only the most limited judicial interrogation of jurors”) (quoting Graham C. Lilley, *The Decline of the American Jury*, 71 U. COLO. L. REV. 53, 69 (2001), and citing FED. R. EVID. 606(b)). Conversely, jury instructions containing detailed theoretical guidance on how to apply fairness and efficiency criteria would be required to constrain jury decisions and would likely impermissibly interfere with acceptable standards for jury deliberations. *See, e.g.*, Coleman, *supra*, at 18 n.104 (noting that special verdicts and jury interrogatories are an exception and that the questions posed “are broad in form, mingling elements of law and fact in a manner similar to the general verdict”) (quoting Mark S. Brodin, *Accuracy, Efficiency, and Accountability in the Litigation Process—The Case for the Fact Verdict*, 59 U. CIN. L. REV. 15, 22 (1990)).

230. *Cf.* *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 388-89 (1996) (discussing the relative abilities of judges and juries to construe patent claims and allocating the task of claim construction to judges, who can “better preserve the patent’s internal coherence”).

231. Claim construction necessarily presumes that the language of claims must have some meaning that limits application. *Cf. supra* notes 53-55 and accompanying text (discussing historic reasons articulated by the Supreme Court for distinct claiming language). The very premise of claim construction is to fix the meaning of the claim language actually employed to describe an invention, so as to specify the range of its application, even if the claim language reflects indeterminate linguistic practices and does not fully capture the scope of invention. *Cf. supra* notes 96-97 and accompanying text.

are more likely to result in over-inclusion of any such potential scope. Given that the equivalents are considered to be factually similar to what the construed meaning of the claim excludes, findings of equivalence must centripetally approach and cross the borderline that avoids vitiating the construed limitations of the claim.<sup>232</sup>

Nonliteral construction also would be more likely than the vitiation standard to result in narrower patent scope, if one is attempting to preserve the validity of the claim.<sup>233</sup> For a particular case, a hypothetical claim may be more narrowly crafted to apply solely to the equivalent at issue, whereas a nonliteral construction must be adopted with all potential applications in mind.<sup>234</sup> In practice, consideration of such future applications may thus be more constraining of judges' interpretive discretion. Further, nonliteral constructions will limit subsequent infringement determinations under principles of stare decisis and collateral estoppel, while vitiation limits will rarely if ever apply to and be constraining for subsequent fac-

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232. *Cf.* *Computer Assocs. v. Altai Inc.*, 982 F.2d 693, 696-702 (2d Cir. 1992) (discussing copyright tests for determining substantial similarity, based on abstraction from and comparison to embodiments). Unlike claim construction, no conceptual premise of definite application exists to limit factual equivalency of copyrighted and allegedly infringing works.

233. Although the Supreme Court and the Federal Circuit have criticized varying the meaning of clear claims to preserve validity or to prevent implied disclaimers, they also have encouraged construing ambiguous claims to preserve validity and to uphold the rights of patentees. *Cf.* *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 911 (Fed. Cir. 2004) (noting the “familiar axiom that claims should be so construed, if possible, as to sustain their validity”) (quoting *Rhine v. Casio, Inc.*, 183 F.3d 1342, 1345 (Fed. Cir. 1999)). *Compare, e.g., supra* notes 76, 89 and accompanying text (citing cases holding it improper to alter the scope of clear claims by construction), *with* *Klein v. Russell*, 86 U.S. (19 Wall.) 433, 466 (1873) (Liberal construction to preserve validity is permissible “if this can be done consistently with the language [the patentee] has employed.”), *and* *Turill v. Michigan S. RR.*, 68 U.S. (1 Wall.) 491, 510 (1863) (Patents “are to receive a liberal construction and, under the fair application of *ut res magis valeat quam pereat*, are, if practicable, to be so interpreted as to uphold and not destroy the right of the inventor.”). The Federal Circuit is likely to (and the Supreme Court may) revisit this issue. *See supra* note 9.

234. *See, e.g.,* Henrik H. Parker, *Doctrine of Equivalents Analysis After Wilson Sporting Goods: The Hypothetical Claim Hydra*, 18 *AIPLA Q.J.* 262, 278-80 (1990) (describing differences in validity that depend on how hypothetical claims are drafted); Katherine E. White, *Festo: A Case Contravening the Convergence of Doctrine of Equivalents Jurisprudence in Germany, the United Kingdom, and the United States*, 8 *MICH. TELECOMM. TECH. L. REV.* 1, 31-32 (2002) (describing how the scope of hypothetical claims can vary and criticizing use of hypothetical claims that include elements that are literally infringed by the accused device or that include additional elements to the claim limitations). This is true even without regard to whether the hypothetical claim would impermissibly add new matter.

tual equivalency determinations.<sup>235</sup> For this reason, judges may be more likely to consider valid a hypothetical claim drawn to the equivalent and subject to the vitiation standard than a nonliterally construed claim of the same breadth. For either reason, nonliteral construction is more likely to prevent overextension of patent protection.

### 3. *Procedural Complexity, Added Costs, and Shifting Roles*

Nonliteral construction also would be preferable to the modern doctrine of equivalents, which adds needless procedural complexity, cost, and role confusion to the difficult process of determining a patent's scope and application. The modern doctrine essentially duplicates the policy and factual judgments required for literal or nonliteral direct application of patent claims. As discussed above, different formal rules for evidence and for judicial review apply in the Patent Office and in the courts to claim construction and application decisions and to findings of equivalency under the modern doctrine. The shift from legal claim construction and factual application decisions to factual determinations under the modern doctrine of equivalents thus alters the nature of, extent of judicial control over, and temporal stability of the interpretive judgments at issue. Broadening patent scope through nonliteral interpretation of claims should be preferable to applying the modern doctrine, because the need for such protection reflects policy judgments more than factual findings. The procedures applicable to claim construction rather than to factual findings of equivalence thus will better assure that such policy judgments are properly made.<sup>236</sup>

The Patent Office is obliged to give the terms of the claims their broadest reasonable construction (as understood at the time of filing) and to reject claims that are overbroad when so construed.<sup>237</sup> Although the Patent Office does not directly apply claims or make factual equivalency judgments for infringement purposes, it nevertheless makes identity judgments when evaluating claim validity. The Patent Office does not evaluate unclaimed existing or future equivalents of claims for patentability. The Federal Circuit reviews Patent Office claim constructions de novo on appeal from validity rejections, and reviews Patent Office factual findings

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235. See *Markman*, 517 U.S. at 390-91 (discussing conditions under which claim interpretations will be binding on subsequent courts and parties). See generally Rachel M. Clark, *Collateral Estoppel of Claim Interpretation After Markman*, 86 MINN. L. REV. 1581 (2002).

236. See *supra* notes 106-29 and accompanying text.

237. See *supra* note 11 and accompanying text; cf. *supra* note 14 and accompanying text (claim construction by judges based on meanings at the time of filing); *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1330 (Fed. Cir. 2003) ("It is axiomatic that claims are construed the same way for both invalidity and infringement.").

for substantial evidence.<sup>238</sup> Although nonliteral construction likely would make Patent Office examination more complex and prosecution more costly, it would not duplicate the functions that the Patent Office performs. Rather, nonliteral construction would revise only the nature of the broadest reasonable construction of the claim.<sup>239</sup>

Claim construction decisions by district court judges in infringement actions are questions of law, subject to de novo review.<sup>240</sup> In contrast, both direct infringement by application of interpreted claims and broader factual equivalency determinations are questions of fact<sup>241</sup> that are reviewed

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238. See *Dickinson v. Zurko*, 527 U.S. 150, 161-65 (1999) (stating that the Federal Circuit reviews PTO denials of patent claims based on factual judgments under Administrative Procedure Act review standards rather than under the clearly erroneous standard); *In re Gartside*, 203 F.3d 1305, 1315 (Fed. Cir. 2000) (applying the substantial evidence standard of the Administrative Procedure Act, rather than arbitrary and capricious standard); *In re Donaldson*, 16 F.3d 1189, 1192 (Fed. Cir. 1994) (discussing de novo review of PTO claim constructions).

239. Because claim scope would expand when applying nonliteral interpretations, the Patent Office would be more likely to reject both original and amended claims, resulting in an increase in amendments or appeals and in narrower claim language in issued patents. Cf. Joseph S. Miller & James A. Hilsenteger, *The Proven Key: Roles & Rules for Dictionaries in the Patent Office and the Courts*, 54 AM. U. L. REV. (forthcoming 2005) (discussing the increased costs of prosecution from requiring dictionary choices to be made during prosecution and noting how those costs likely would be outweighed by reduced costs of determining patent scope after issuance), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=577262](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=577262) (last visited Dec. 19, 2004). The extent of the increase in prosecution costs is hard to predict, particularly as prosecution history estoppel already encourages amendment or appeal of original claims that are rejected when applying literal interpretations.

240. See *Cybor Corp. v. FAS Tech., Inc.*, 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc) (holding that claim construction is subject to de novo review, with underlying factual issues subject to the clear error standard); *Markman*, 517 U.S. at 388-91 (Construction is a question of law for the judge, even if it involves factual determinations regarding the meaning of terms of art.) (citing, *inter alia*, *Winans v. Denmeade*, 56 U.S. 330, 338 (1853)); cf. Nard, *supra* note 7, at 22-35 (discussing the “ideological badinage” that followed *Markman* on the Federal Circuit); Rai, *supra* note 109, at 1047-48, 1053 (The Federal Circuit has defined claim construction as a question of “pure law” contrary to the “mongrel practice” recognized by the Supreme Court in *Markman*.) (citing *Markman*, 517 U.S. at 378, 388). Although patent claims are construed as a matter of law, testimony may be required to determine what the terms of the claims would have meant to skilled practitioners in the relevant technical field at the time of the patent application. See *Markman*, 517 U.S. at 389-90.

241. Cf. Rai, *supra* note 109, at 1057-59 (discussing additional cases preceding *Cybor* where the Federal Circuit applied various standards to review factual judgments underlying claim construction, judicial claim construction in bench trials, and factual issues required for claim construction that were submitted to juries). For claims that employ functional language, the determination of whether an allegedly infringing product

for clear error when made by judges<sup>242</sup> and for substantial evidence when made by juries<sup>243</sup> (although judgment as a matter of law based on undisputed facts is a question of law reviewed de novo).<sup>244</sup> Patent claims are interpreted by judges with reference to: (1) the disclosure of the invention in the patent's specification; (2) the prosecution history of the patent before the Patent Office; and (3) extrinsic evidence of the meaning of the terms employed in the patent.<sup>245</sup> Thus, claim construction is to some extent limited by such evidence, even for liberal and nonliteral interpretations, without regard to the order or emphasis to be placed on the different sources of interpretive information.<sup>246</sup>

Direct application and factual equivalency determinations are currently made by reference to all admissible evidence presented in the particular case.<sup>247</sup> Such evidence may vary dramatically among trials and over time. Jury decisions are limited only by judgments as a matter of law or by appellate reversal. Although the evidence used to ground claim constructions also may vary among trials and over time, such variation is less likely to result in different construction judgments, as a result of greater fixity of

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or process can be considered an equivalent to the claimed invention may be a question of law, because that determination requires construction of the scope of the functional language. *See* 35 U.S.C. § 112 ¶ 6 (2000); *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1309 (Fed. Cir. 1998) (declining to reach the question and noting that it was expressly left unanswered by the en banc decision in *Markman*, 52 F.3d 967, 977 n.8 (Fed. Cir. 1995) (en banc)).

242. *See* FED. R. CIV. P. 52(a); *Insituform Techs., Inc. v. Cat Contracting, Inc.*, 161 F.3d 688, 692 (Fed. Cir. 1998).

243. *See* FED. R. CIV. P. 52(a); *Teleflex, Inc. v. Ficoso N. Am. Corp.*, 299 F.3d 1313, 1323 (Fed. Cir. 2002).

244. *See, e.g., Cybor*, 138 F.3d at 1456 (substantial evidence standard incorporated into de novo review of denials of judgment as a matter of law).

245. *See, e.g., Eastman Kodak Co. v. Goodyear Tire & Rubber Co.*, 114 F.3d 1547, 1555 (Fed. Cir. 1997), *limited in part*, *Cybor Corp. v. FAS Tech., Inc.*, 138 F.3d 1448 (Fed. Cir. 1998) (en banc); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996); *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 986 (Fed. Cir. 1995). *See generally* Nard, *supra* note 7, at 12-23.

246. *See, e.g., Nard*, *supra* note 7, at 43 (discussing the different emphases that "hypertextualists" and "pragmatic textualists" place on differing types of intrinsic and extrinsic evidence of claim meaning, and locating limits to pragmatic textual analysis in "the underlying linguistic assumptions of the relevant technological community"); *supra* note 9.

247. *See Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 141 (1999) (applying the *Daubert* standard to "'technical' and 'other specialized' knowledge"); *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 142-43 (1997) (stating that *Daubert* judgments are reviewed for an abuse of discretion); *Daubert v. Merill Dow Pharms.*, 509 U.S. 579, 597 (1993) (holding that scientific evidence is admissible if relevant and reliable).

evidence regarding meaning and because of application of principles of stare decisis.<sup>248</sup>

Because these different formal rules apply to construing and applying claims in the Patent Office and in the courts, the modern doctrine avoids the complex procedures that prevent claims from being construed to apply to broader ranges of equivalents, or that would invalidate the claims if they were interpreted to do so. The modern doctrine protects claims and factual equivalency judgments against institutional reversal by shifting policy judgments to more deferential factual and less determinate doctrinal review standards, particularly given that formal principles of repose do not apply to such factual judgments.

By changing the formal rules and roles for judges and juries, moreover, the modern doctrine more than doubles the procedural costs of the patent system. Judges must make construction and factual judgments twice, once for claim construction and direct application and once for equivalents protection and vitiation. Juries must make factual judgments twice, once for direct application and once for equivalents protection. But juries also must make new policy-based similarity judgments when determining factual equivalency. Much ink has been spilled on the procedural costs of reviewing claim constructions at various stages of litigation.<sup>249</sup> But these costs are inherent in a system of legal determination with review for errors. In contrast, the additional costs to the patent system of the modern doctrine of equivalents are avoidable.

## **B. *Festo* and the Relative Benefits of Nonliteral Interpretation**

The facts of the *Festo* case<sup>250</sup> illustrate how literal or nonliteral claim construction is more likely than the modern doctrine of equivalents to result in fairer, more certain, and less costly patent protection. The claims of one of the patents at issue addressed narrow improvements in magnetic,

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248. See *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390-91 (1994) (discussing uniformity concerns as better addressed by allocating claim construction to judges who will follow stare decisis than to juries, subject to evidentiary variation limited only by collateral estoppel, where applicable).

249. See, e.g., Michael A. O'Shea, *A Changing Role for the Markman Hearing: In Light of Festo IX, Markman Hearings Could Become M-F-G Hearings, Which Are Longer, More Complex, and Ripe for Appeal*, 37 CREIGHTON L. REV. 843, 856 (2004) (discussing how pre-trial claim interpretations without the opportunity for interlocutory appeal forces potentially unnecessary expenditures on trials); Robert C. Weiss & Todd R. Miller, *Practical Tips on Enforcing and Defending Patents*, 85 J. PAT. & TRADEMARK OFF. SOC'Y 791, 796-98 (2003) (discussing various discovery and proof costs avoided by pre-trial claim interpretations).

250. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722 (2002).

rodless cylinders. The amended claim adopted limitations for: (1) a sleeve of “magnetizable metal,” which has the functional advantage of reducing magnetic stresses; and (2) “sealing rings located axially outside [the] guide rings [encircling the piston and slidingly engaging the internal wall of the tube] for wiping [the] internal wall as [the] piston moves along [the] tube,” which prevents impurities present in the tube from contacting and interfering with the piston.<sup>251</sup> Festo sued SMC for infringement, although SMC’s cylinders used aluminum (a non-magnetizable metal) for the sleeve and contained only a single sealing ring at one end of the piston, having a “two-way lip” to wipe the cylinder.<sup>252</sup> Festo did not appeal the District Court holdings that SMC’s cylinders did not directly infringe the patent’s claims, however liberally the claim limitations might have been construed.<sup>253</sup> After reviewing the prosecution history, the District Court allowed the jury to find that SMC had infringed the relevant patent under the doctrine of equivalents (that is, aluminum was equivalent to a magnetizable metal and the single two-way sealing ring was equivalent to a plurality of sealing rings located outside the guide rings).<sup>254</sup>

It is beyond question that the added elements of the claim prevented a literal interpretation (and likely prevented a nonliteral interpretation) that would have directly applied to SMC’s invention. Aluminum is not magnetizable; one sealing ring is not two (or more). Accordingly, a finding of equivalency also should vitiate these claim limitations.<sup>255</sup> But this would be true regardless of whether the patentee had amended the claim or had included the limitations in original claims, and thus regardless of whether prosecution history estoppel would apply (that is, based on the unforeseeability of the limitation or the degree of relationship of the reasons for adding the limitation).<sup>256</sup> Further, as in *Graver Tank*, aluminum sleeves and single rings may have been disclosed in the prior art (or at least have

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251. U.S. Patent No. 4,354,125, Claim 1 (issued Oct. 12, 1982). *See Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558, 579-83 (Fed. Cir. 2000) (en banc).

252. *Id.*

253. *See Festo*, 234 F.3d at 584.

254. *See id.* at 585. The jury’s special verdict found that “non-magnetizable sleeve and single sealing ring performed substantially the same function in substantially the same way to obtain substantially the same result as the claimed magnetizable sleeve and pair of sealing rings.” *Id.*

255. *See supra* note 128.

256. *See Festo*, 535 U.S. at 741; *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 344 F.3d 1359, 1369-72 (2003) (en banc). Rather, such prosecution history can provide only additional reasons for limiting literal or nonliteral interpretation and factual equivalency determinations.

been obvious in light of the art) and thus might not have been claimable, using either specific language or broader generic language (which also might have been inoperative or might have failed to reflect the actual scope of the invention).<sup>257</sup> Thus, there was absolutely no basis to proceed to trial under the modern doctrine.

The doctrinal choice of claim construction and application or of the modern doctrine of equivalents also makes a substantial difference to the patentee, the Patent Office, the court, and the public's understanding of the scope of the patent that issued. Even for nonliteral construction, the focus would have been on how broadly to construe the words "magnetizable" and "rings," in order to reflect the scope of invention disclosed and not impliedly disclaimed by using the restrictive claim language. The "fair" scope of the patent would have been determined as a unified construction of the claim that would affect subsequent interpretations through *stare decisis* and collateral estoppel.<sup>258</sup> Nonliteral interpretation, moreover, likely would have led to rejection of the claim for this narrow improvement invention in the Patent Office or to have rendered it invalid in the courts, under prior art limitations or claim-language and claim-scope doctrines. In that case, the patent might never have issued or might have been found to be unenforceable against anyone at any time. By choosing nonliteral claim construction over the modern doctrine, moreover, the courts (*ex post* to patent issuance) and the Patent Office (*ex ante*) would have been required to determine the "fair" scope of protection on a wholesale rather than a retail basis. For reasons discussed above, the costs of retail tailoring should be considered too great.<sup>259</sup>

Finally, the patentee could not with a straight face have argued during prosecution or in court that the invention for which protection was sought and obtained included *all* rodless cylinders not containing the limitations suggested by the non-magnetizable metal and sealing rings terms added by

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257. See *Festo*, 234 F.3d at 587-88 (noting that the magnetic sleeve was a limitation of an originally filed dependent claim, and that its addition to the later-substituted independent claim was not explained by the examiner's rejection or the patentee's response in the prosecution record); *id.* at 588-89 (suggesting that the plural sealing rings limitation was added to distinguish single-sealing rings in the prior art).

258. In *Festo*, the relevant patent was issued in 1982, and thus perceptions regarding the scope of protection would not have been affected by the many judicial decisions that were rendered after the patent had expired in 1999.

259. *But cf.* Rai, *supra* note 109, at 1040 ("[B]right-line rules cannot be expected to do a good job of furthering innovation goals of patent law.").

amendment.<sup>260</sup> The Patent Office and the courts invariably will apply some limits even to nonliteral interpretations of the specific language adopted.<sup>261</sup> In contrast, under the vitiation standard, the modern doctrine of equivalents may more readily elide any such limits on linguistic meaning. But we must continue to wait to see how the Federal Circuit or the Supreme Court resolves the vitiation question in the *Festo* case, and whether it provides any guidance when doing so.<sup>262</sup>

The *Festo* case has languished in the courts for over a decade, at substantial expense to the parties and to the public. Whatever the decision on remand and subsequent appeals hold, little guidance will be provided to the public or to competitors regarding the limits of patent rights in general. In fact, it would be difficult to predict the outcome of a case arising in the future with similar facts, even with the greater clarity regarding the modern doctrine and its relation to prosecution history estoppel that the *Festo* decision provided.<sup>263</sup> Although limiting patent protection to the direct application of construed claims might not have prevented the suit, it certainly would have shortened the suit and would have provided the public with additional guidance for future conduct. Abolishing the modern doctrine of equivalents would multiply these benefits over time for all patents for their useful lives.

## VI. CONCLUSION

The Supreme Court has created a doctrinal morass for American patent law by authorizing protection beyond the scope of application of construed claims. The modern doctrine of equivalents was adopted without statutory warrant in *Graver Tank*. The Court's recent decision in *Festo* will not re-

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260. See, e.g., *Bell & Howell Document Mgmt. Prods. Co. v. Altek Sys.*, 132 F.3d 701, 707 (Fed. Cir. 1997) (rejecting district court construction that was based on the belief that the relevant claim term otherwise would have been superfluous).

261. Cf. *White v. Dunbar*, 119 U.S. 47, 51 (1886) ("Some persons seem to suppose that a claim in a patent is like a nose of wax, which may be turned and twisted in any direction, by merely referring to the specification, so as to make it include something more than, or something different from, what its words express. The context may, undoubtedly, be resorted to, and often is resorted to, for the purpose of better understanding the meaning of the claim; but not for the purpose of changing it, and making it different from what it is.").

262. The petition for rehearing en banc filed by SMC for the Federal Circuit to address vitiation was denied on Nov. 5, 2003. See *Festo*, 344 F.3d at 1359; SMC's Petition for (En Banc) Rehearing, at 5-8 (on file with the author) (citing, *inter alia*, *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1346 (Fed. Cir. 2001)).

263. See generally Sarnoff, *supra* note 31, *passim*.

lieve the doctrinal tensions nor reduce the additional costs and complexity added to the patent system by the modern doctrine. Instead, the Court or Congress needs to restore the law to its state under the 1870 Patent Act, strictly limiting patentees to the scope of application of construed claims and thereby impliedly disclaiming to the public any disclosed patentable subject matter that is not claimed. Simplicity and conceptual elegance are virtues in the law, even if they are not in our efforts to understand the natural world.<sup>264</sup>

By abolishing the modern doctrine of equivalents and by limiting patent scope to equivalent embodiments of literally construed claims, moreover, the Court or Congress will assure that the patent protects what the applicant regards as the invention and will minimize the social costs of determining how far the patent extends. To the extent that the Court or Congress finds that literal construction of claims would be unfair, it can expressly authorize nonliteral construction. Nonliteral construction would be a cheaper and better alternative to the modern doctrine.

Once the modern doctrine is abolished, the Supreme Court or Congress should review and revise the claim-language, claim-scope limitation, claim-scope interpretation, disclaimer, and claim-application doctrines that have been developed over the last two centuries. In particular, theoretical and empirical scrutiny is warranted regarding the range and timing of embodiments that validly can be claimed for both pioneering and improvement inventions in different fields of technology. Scrutiny is also warranted regarding the scope of functional or structural language that can be used to claim existing and later-arising embodiments. The Federal Circuit has taken a first step, by requesting briefing to reconsider many of its claim-scope interpretation doctrines.<sup>265</sup> But the Federal Circuit's review will not be enough. The Supreme Court or Congress also should review these doctrines, as well as additional doctrines that determine whether the patent system efficiently encourages both initial and sequential investment, invention, and disclosure and thereby "promote[s] the Progress of Science and useful Arts."<sup>266</sup>

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264. Cf. Peter Drummond, *Elegance: Keeping It Simple and Testable*, PHYSICS TODAY ONLINE, available at <http://www.aip.org/pt/vol-53/iss-8/p12b.html> (last visited Dec. 19, 2004) ("In the interest of clearness, it appeared to me inevitable that I should repeat myself frequently, without paying the slightest attention to the elegance of the presentation. I adhered scrupulously to the precept of that brilliant theoretical physicist L. Boltzmann, according to whom matters of elegance ought to be left to the tailor and the cobbler.") (quoting ALBERT EINSTEIN, RELATIVITY (1916)).

265. See *supra* note 9.

266. U.S. CONST. art. I, § 8, cl. 8.