THE YALE LAW JOURNAL

PETER LEE

Patent Law and the Two Cultures

ABSTRACT. A half-century ago, author and physicist C.P. Snow warned of a "gulf of mutual incomprehension" between the liberal arts and sciences. Snow's "Two Cultures" thesis is particularly relevant to patent law, a realm where law and science intersect. Drawing on Snow's framework, this Article addresses challenges that arise when lay judges must engage, understand, and ultimately pass judgment on complex technologies. It first argues that technological subject matter imposes significant cognitive burdens on generalist judges. It then explores the "cognitive miser" model whereby laypersons adopt heuristics and defer to expertise to mitigate these burdens. Drawing from this psychological model, the Article then explores the unique role of formalism in patent doctrine. Advancing an information-cost theory of Federal Circuit jurisprudence, it argues that formalism limits and streamlines judicial engagement with technology. Formalism truncates difficult technical inquiries, thus helping to mediate the intersection of law and science. The Article then identifies a countervailing trend in recent Supreme Court patent decisions. In addition to substantively narrowing patent rights, the Court is systematically rejecting formalistic rules in favor of holistic standards. This so-called holistic turn promises to increase judicial engagement with technology. To address resulting cognitive burdens, this Article offers prescriptions for blending the economizing virtues of rules with the flexibility and contextual sensitivity of standards. It concludes by exploring the cultural differences of the Federal Circuit and the Supreme Court as well as the implications of those differences for patent doctrine.

AUTHOR. Professor of Law, UC Davis School of Law. Thanks to Mark Bartholomew, Dan Burk, Tun-Jen Chiang, Colleen Chien, Chester Chuang, Kevin Collins, Dennis Crouch, Rochelle Dreyfuss, John Duffy, Rebecca Eisenberg, Dave Fagundes, Jeanne Fromer, John Golden, Eric Goldman, Art Hinshaw, Tim Holbrook, Brian Holland, Jiye Kim, Mark Lemley, Oskar Liivak, Al Lin, Tyler Ochoa, Maureen O'Rourke, Michael Risch, Dave Schwartz, Donna Shestowsky, Ted Sichelman, John Tehranian, and Xiao Yang for extremely helpful insights on earlier drafts of this Article. Thanks as well to symposium participants at Cardozo School of Law, Santa Clara University School of Law, Seton Hall University School of Law, Arizona State University O'Connor College of Law, and Michigan State University College of Law for valuable comments and suggestions. I am grateful to Dean Kevin Johnson and Associate Dean Vikram Amar for providing generous institutional support for this project. I would also like to thank Tiffany Bui, Lorin Kline, Bryce Newell, Richard Stack, and the UC Davis School of Law library staff for wonderful research assistance. Finally, I would like to thank Lisa Larrimore Ouellette and the exceptional editorial staff of *The Yale Law Journal*.

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"Patent litigation is like the neurosurgery of litigation: it is hard scientifically and it is hard legally."[1]

INTRODUCTION

The Hon. James F. Holderman, Chief Judge of the Northern District of Illinois, sees a fair number of patent cases. As such, he is no stranger to advanced technologies, having presided over cases involving wireless portable communication devices,[2] anti-theft systems,[3] and wavelength division multiplexed optical communication systems.[4] Recently, he had this to say about patent disputes:

> Patent litigation is different . . . . It is more complicated, more time-consuming and more mentally taxing because typically the patent being litigated is a successful advancement of some science or technology. So, the judge has to understand that background just to get to the factual basis of the problem and then deal with legal aspects.[5]

These challenges form the subject of this Article.

As a general matter, lawyers and science don't mix.[6] This fact of legal life reflects a broader epistemological schism best captured in an influential 1959 lecture by C.P. Snow, entitled "The Two Cultures."[7] By invoking "culture," Snow did not refer to ethnic, religious, or national groups. Rather, he sought to describe a deep intellectual divide between literary and scientific cultures.

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1. Kathleen M. O'Malley, Patti Saris & Ronald H. Whyte, *A Panel Discussion: Claim Construction from the Perspective of the District Judge*, 54 CASE W. RES. L. REV. 671, 682 (2004) (statement of Hon. Patti Saris).
2. Intellect Wireless, Inc. v. Kyocera Commc'ns, Inc., No. 08 C 1350, 2009 WL 3259996 (N.D. Ill. Oct. 8, 2009).
3. Se-Kure Controls, Inc. v. Sennco Solutions, Inc., 675 F. Supp. 2d 877 (N.D. Ill. 2009).
4. Tellabs Operations, Inc. v. Fujitsu Ltd., No. 08 C 3379, 2009 WL 1329153 (N.D. Ill. May 13, 2009).
5. Rachel M. Zahorsky, *Patent Pending*, A.B.A. J., Jan. 2010, at 11 (statement of Hon. James F. Holderman).
6. CARNEGIE COMM'N ON SCI., TECH. & GOV'T, SCIENCE AND TECHNOLOGY IN JUDICIAL DECISION MAKING: CREATING OPPORTUNITIES AND MEETING CHALLENGES 19 (1993) [hereinafter CARNEGIE COMM'N] ("At the moment, the parallel paths of scientists and lawyers usually obey the rules of Euclidean geometry—they do not intersect—even though both disciplines not infrequently ponder the same subjects. And when their paths do cross, the result is often misunderstanding, rather than constructive communication.").
7. C.P. SNOW, THE TWO CULTURES (Canto ed. 1998).

Reflecting on his background as an author and physicist, he warned of a dangerous "gulf of mutual incomprehension" between the liberal arts and sciences.[8] Although Snow's remarks arose within a particular social and historical context,[9] his thesis has become an enduring metaphor for the challenges of intellectual specialization,[10] and I invoke it here in this sense. Snow's dichotomy is, of course, a gross generalization.[11] But in its stark duality, the "Two Cultures" captures an anxiety readily apparent to many lawyers when confronting scientific complexity.[12] While Snow did not directly address patent law, his metaphor is highly salient to the patent system–a realm where law and science intersect.[13]

Drawing on the "Two Cultures," this Article explores challenges that arise when lay judges must engage, understand, and ultimately pass judgment on complex technologies. Much patent scholarship focuses on the important

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8. *Id.* at 4.

9. Snow, a British citizen, was largely critiquing the compartmentalized nature of postwar British education. Stefan Collini, *Introduction* to SNOW, *supra* note 7, at vii, xvi-xvii; Benjamin R. Cohen, *Science and Humanities: Across Two Cultures and into Science Studies*, 25 ENDEAVOUR 8, 8 (2001).

10. *See* Collini, *supra* note 9, at lxi-lxxi.

11. Snow acknowledged the reductionist character of his thesis. SNOW, *supra* note 7, at 9. *But see* Cynthia M. Pyle, *The Two Cultures and Renaissance Humanism*, 33 INTERDISC. SCI. REVS. 121, 129 (2008) (suggesting that conceptual dichotomies "may well be fundamental to human thought"). Clearly, there is not *one* scientific culture, but many; the theoretical physicist may feel quite removed from the field biologist. Furthermore, scientific and technological cultures are distinct, as academic scientists may share little in common with garage inventors. *But see* SNOW, *supra* note 7, at 67. Similarly, there is a vast array of "literary intellectuals," and much of social science straddles the literary and scientific realms. Pyle, *supra*, at 122, 125-27 (noting that "[a] number of recent studies have implied that the so-called 'social sciences' . . . are the logical bridge between the humanities and the sciences"). For additional criticisms of the "Two Cultures" thesis, see Cohen, *supra* note 9, at 11; José van Dijck, *After the "Two Cultures": Toward a "(Multi)cultural" Practice of Science Communication*, 25 SCI. COMM. 177 (2003); and John Hultberg, *The Two Cultures Revisited*, 18 SCI. COMM. 194, 206-07 (1997). My aim is not to categorically defend Snow's thesis, but to apply it as a helpful (but contested) lens for viewing the patent system.

12. *Cf.* SNOW, *supra* note 7, at 22 ("Intellectuals, in particular literary intellectuals, are natural Luddites.").

13. *Cf.* Sheila Jasanoff, *Law's Knowledge: Science for Justice in Legal Settings*, 95 AM. J. PUB. HEALTH S49, S51 (Supp. 1 2005) (characterizing law and science as "clashing cultures"). It bears emphasizing that the foils to Snow's scientists were not lawyers per se, but a broader class of "literary intellectuals." Nevertheless, the cultural split between literary and scientific intellectuals that Snow describes is one that patent law must try to reconcile.

question of how to structure exclusive rights to maximize innovation.[14] However, this Article takes a different approach, building on a rich literature addressing the institutional dimensions of patent adjudication, which are critical to a well-functioning patent system.[15] It proceeds on the premise that no matter how elegantly policymakers craft patent law, if generalist judges lack the capacity to administer it, the patent system cannot fulfill its objectives. In so doing, this Article sheds new light on the ways in which doctrine can mediate (and complicate) the intersection of legal and scientific cultures.[16]

The Article proceeds in six parts. Part I argues that patented technologies impose significant cognitive burdens on lay actors—particularly district

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14. Examples are too numerous to mention, but representative works include JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (2008); Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017 (1989); Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989 (1997); and Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839 (1990).

15. *See, e.g.*, Donald S. Chisum, Lecture, *The Supreme Court and Patent Law: Does Shallow Reasoning Lead to Thin Law?*, 3 MARQ. INTELL. PROP. L. REV. 1 (1999); Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1 (1989) [hereinafter Dreyfuss, *The Federal Circuit*]; Rochelle Cooper Dreyfuss, *The Federal Circuit: A Continuing Experiment in Specialization*, 54 CASE W. RES. L. REV. 769 (2004) [hereinafter Dreyfuss, *Continuing Experiment*]; Rochelle Cooper Dreyfuss, *In Search of Institutional Identity: The Federal Circuit Comes of Age*, 23 BERKELEY TECH. L.J. 787 (2008) [hereinafter Dreyfuss, *Institutional Identity*]; Rochelle Cooper Dreyfuss, Lecture, *What the Federal Circuit Can Learn from the Supreme Court—And Vice Versa*, 59 AM. U. L. REV. 787 (2010) [hereinafter Dreyfuss, *What the Federal Circuit Can Learn*]; John F. Duffy, *The* Festo *Decision and the Return of the Supreme Court to the Bar of Patents*, 2002 SUP. CT. REV. 273; John M. Golden, *The Supreme Court as "Prime Percolator": A Prescription for Appellate Review of Questions in Patent Law*, 56 UCLA L. REV. 657 (2009); Mark D. Janis, *Patent Law in the Age of the Invisible Supreme Court*, 2001 U. ILL. L. REV. 387; Craig Allen Nard, *Toward a Cautious Approach to Obeisance: The Role of Scholarship in Federal Circuit Patent Law Jurisprudence*, 39 HOUS. L. REV. 667 (2002); Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035 (2003); John R. Thomas, *Formalism at the Federal Circuit*, 52 AM. U. L. REV. 771 (2003); R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105 (2004).

16. This intersection has been the subject of extensive academic commentary ranging well beyond patent law. *See, e.g.*, STEVEN GOLDBERG, CULTURE CLASH: LAW AND SCIENCE IN AMERICA (1994); SHEILA JASANOFF, SCIENCE AT THE BAR: LAW, SCIENCE, AND TECHNOLOGY IN AMERICA (1997); Harold P. Green, *The Law-Science Interface in Public Policy Decisionmaking*, 51 OHIO ST. L.J. 375 (1990); Robert P. Merges, *The Nature and Necessity of Law and Science*, 38 J. LEGAL EDUC. 315 (1988); Peter H. Schuck, *Multi-Culturalism Redux: Science, Law, and Politics*, 11 YALE L. & POL'Y REV. 1 (1993); Milton R. Wessel, *Adversary Science and the Adversary Scientist: Threats to Responsible Dispute Resolution*, 28 JURIMETRICS J. 379 (1988).

judges – in the patent system.[17] Many judges doubt their ability to comprehend the patented inventions before them. Patent commentators and empirical studies suggest that this anxiety is well founded. Policymakers and scholars have proposed a number of mechanisms to address the cognitive demands of patent adjudication, but none is entirely satisfactory.

Part II exploits an underutilized resource for understanding the difficulties of patent adjudication: the psychology of technological engagement. Surveying the psychological literature, this Part first confirms that complex technologies impose significant cognitive burdens on lay individuals. It goes on to examine variants of the "cognitive miser" model wherein individuals adopt heuristics and defer to expert opinion to reduce information costs associated with technological engagement.

Part III draws from these psychological findings to offer an information-cost theory of Federal Circuit patent doctrine.[18] Scholars have long recognized that Federal Circuit patent doctrine is highly formalistic.[19] This Part goes further to explore how formalism mediates technological engagement by generalist judges. Examining several areas of patent doctrine, I argue that formalism is an inherently "inquiry-truncating" methodology that reduces the degree to which lay judges must engage with technological subject matter. Thus, for example, the Federal Circuit's historically formalistic approach to nonobviousness helped delimit and streamline potentially expansive inquiries into patented inventions. In this sense, formalism allows judges to operate as cognitive misers.

Part IV then reveals an undertheorized, countervailing trend in recent Supreme Court patent decisions. Starting about a decade and a half ago, the Supreme Court has more aggressively asserted its appellate jurisdiction over the Federal Circuit, reversing several significant lines of precedent. Scholars have rightly highlighted the important substantive impact of these decisions, which tend to constrain patent rights. However, I argue that recent Supreme Court decisions also exhibit a significant and less noticed *methodological* shift. In short, the Court is systematically favoring "holistic" standards over formalistic rules in a variety of areas of patent doctrine. These information-demanding standards tend to enhance the degree to which district judges must grapple with technological context.

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17. I focus on judges because of their centrality to patent adjudication. While much of this Article's psychological analysis applies as well to jurors, their unique role in patent litigation warrants separate treatment.

18. The Court of Appeals for the Federal Circuit is a quasi-specialized court that hears appeals in patent matters. *See infra* notes 126-131 and accompanying text.

19. *See infra* note 132.

Part V examines the implications of the Supreme Court's holistic turn. It first observes that Supreme Court opinions impose high information-cost externalities on district judges. It then explores how the Court can do more to internalize some of those externalities. Drawing from foundational concepts in patent law itself, this Article proposes applying "enablement" principles to Supreme Court patent opinions. By considering and "internalizing" the difficulties of technological engagement, the Supreme Court can produce doctrine that is clearer, more bounded, and easier to apply.

Part VI concludes by examining the cultural differences of the Federal Circuit and the Supreme Court. Returning to the theme of the "Two Cultures," it argues that Federal Circuit formalism arises in significant part from that court's specialized authority over patent law and its day-to-day proximity to patent litigation. It further argues that Supreme Court holism stems from the Court's generalist outlook and its relative insulation from the complexities of technology and patent adjudication.

This Article seeks to make several contributions. It provides novel descriptive theories for longstanding Federal Circuit jurisprudence as well as the Supreme Court's recent forays into patent law. Applying an information-cost analysis, it offers prescriptions for drafting Supreme Court opinions that will improve the administration of patent law. In a broader sense, this Article argues for pluralizing the resources brought to bear on patent scholarship. While such scholarship has profited handsomely from law and economics and empirical studies,[20] this Article shows that academic inquiries into the psychology and sociology of science can illuminate many features of the legal architecture of innovation.[21] While the "objective" natures of science and patent

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20. *See* Nard, *supra* note 15, at 669 & n.9.

21. *Cf.* Martha Minow, *Law Turning Outward*, TELOS, Fall 1987, at 79, 79 ("Given the interdisciplinary trends, legal analysis no longer appears to have a distinctive method removed from politics, social science, and humanities."). For example, sociologies of science have been particularly helpful in revealing communal sharing norms that discourage individual property rights in research discoveries. *See, e.g.*, BERNARD BARBER, SCIENCE AND THE SOCIAL ORDER (1952); WARREN O. HAGSTROM, THE SCIENTIFIC COMMUNITY (1965); ROBERT K. MERTON, THE SOCIOLOGY OF SCIENCE: THEORETICAL AND EMPIRICAL INVESTIGATIONS 275 (Norman W. Storer ed., 1973). Patent scholars have drawn upon these accounts to challenge the propriety of exclusive rights on research technologies. *See, e.g.*, Eisenberg, *supra* note 14; Robert P. Merges, *Property Rights Theory and the Commons: The Case of Scientific Research*, SOC. PHIL. & POL'Y, June 1996, at 145 (1996); Arti Kaur Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NW. U. L. REV. 77 (1999); Katherine J. Strandburg, *Users as Innovators: Implications for Patent Doctrine*, 79 U. COLO. L. REV. 467 (2008). However, these accounts have not gone uncontested. *See* F. Scott Kieff, *Facilitating Scientific Research: Intellectual Property Rights and the Norms of Science—A Response to Rai and Eisenberg*, 95 NW. U. L. REV. 691 (2001).

doctrine seem to resist cultural analysis, this Article insists that cultural concerns pervade the realms of science, technology, and patent adjudication.

While this Article focuses on patent law, its analyses extend to the ever-growing intersection of law and science.[22] As Justice Breyer has noted, "[S]ociety is becoming more dependent for its well-being on scientifically complex technology, so, to an increasing degree, this technology underlies legal issues of importance to all of us."[23] The role of legal doctrine – and particularly, formalism – in managing cognitive burdens has ramifications for a host of legal fields, including biomedical ethics, toxic torts, environmental law, and scientific evidence.[24] This study in patent law thus provides a compartmentalized forum for exploring issues of relevance to the wider legal and technological communities.

I. TECHNOLOGY AND COGNITIVE BURDENS IN THE PATENT SYSTEM

A. Generalist Judges and Technological Anxiety

The intersection of law and science is fraught with anxiety. Judge William Schwarzer, speaking generally about scientific evidence, states:

> The context in which [science and technology issues] arise varies widely, but generally they share one characteristic: They challenge the ability of judges and juries to comprehend the issues – and the evidence – and to deal with them in informed and effective ways. As a result, they tend to complicate the litigation, increase expense and delay, and jeopardize the quality of judicial and jury decision making.[25]

Similarly, the Carnegie Commission on Science, Technology, and Government has noted "widespread allegations that the judicial system is increasingly

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22. *See* Anne M. Corbin & Steven B. Dow, *Breaking the Cycle: Scientific Discourse in Legal Education*, 26 TEMP. J. SCI. TECH. & ENVTL. L. 191, 191 (2007).

23. Stephen Breyer, *The Interdependence of Science and Law*, 280 SCIENCE 537, 537 (1998).

24. *See* CARNEGIE COMM'N, *supra* note 6, at 11-12; Jim Chen, Panegyric, *The Midas Touch*, 7 MINN. J.L. SCI. & TECH., at i, ii (2005); *see also* Margaret Bull Kovera & Bradley D. McAuliff, *The Effects of Peer Review and Evidence Quality on Judge Evaluations of Psychological Science: Are Judges Effective Gatekeepers?*, 85 J. APPLIED PSYCHOL. 574, 574 (2000) (noting challenges inherent to judicial evaluation of scientific evidence).

25. William W Schwarzer, *Introduction* to FED. JUDICIAL CTR., REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 1, 1 (1st ed. 1994).

unable to manage and adjudicate science and technology (S&T) issues."[26] In a famous case involving the unauthorized commercialization of a patient's spleen cells, Justice Mosk of the California Supreme Court questioned the court's ability to understand the medical facts at hand.[27] Judge Thomas Penfield Jackson felt ill equipped to understand the technical details of the Microsoft antitrust case over which he presided a decade ago.[28] More recently, Justice Scalia scoffed at subtleties of atmospheric science in an important case involving global warming.[29]

These examples, culled from scientific evidence, medical research, antitrust, and environmental law, reveal challenges inherent to the intersection of law and science.[30] These challenges are exacerbated by educational specialization; fewer than ten percent of law students have undergraduate degrees in math, science, or engineering,[31] and there is little reason to believe that this proportion is higher among generalist judges.[32] These challenges, moreover,

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26. CARNEGIE COMM'N, *supra* note 6, at 11.

27. According to Justice Mosk,

> As far as I know, no member of this court is trained as a molecular biologist, or even as a physician; without expert testimony in the record, therefore, the majority are not competent to explain these arcane points of medical science any more than a doctor would be competent to explain esoteric questions of the law of negotiable instruments or federal income taxation, or the rule against perpetuities.

Moore v. Regents of the Univ. of Cal., 793 P.2d 479, 522 (Cal. 1990) (Mosk, J., dissenting).

28. Michael Brick, *When the Judge Can't Really Judge: Business Technology Cases Raise Issues of Competence*, N.Y. TIMES, Sept. 11, 2000, at C4.

29. Oral argument in *Massachusetts v. EPA* included the following exchange:

> MR. MILKEY: Respectfully, Your Honor, it is not the stratosphere. It's the troposphere.
> JUSTICE SCALIA: Troposphere, whatever. I told you before I'm not a scientist. (Laughter.)
> JUSTICE SCALIA: That's why I don't want to have to deal with global warming, to tell you the truth.

Transcript of Oral Argument at 22-23, Massachusetts v. EPA, 549 U.S. 497 (2007) (No. 05-1120).

30. Several states have considered introducing specialized courts to focus on technologically complex cases. *See, e.g.*, WILBUR D. PRESTON, JR. ET AL., MARYLAND BUSINESS AND TECHNOLOGY COURT TASK FORCE REPORT (2000), http://www.courts.state.md.us/finalb&treport.pdf.

31. DAVID L. FAIGMAN, LEGAL ALCHEMY: THE USE AND MISUSE OF SCIENCE IN THE LAW 53-54 (1999).

32. *Cf.* Sophia I. Gatowski et al., *Asking the Gatekeepers: A National Survey of Judges on Judging Expert Evidence in a Post-*Daubert *World*, 25 LAW & HUM. BEHAV. 433, 441-42 (2001) (finding

are particularly acute in patent litigation, where lay judges handle cases involving highly complex technologies.[33] As Justice Breyer observes, "Patent law cases can turn almost entirely on an understanding of the underlying technical or scientific subject matter."[34] This Part focuses on the unique challenges facing generalist judges who adjudicate patent cases.[35]

Anxiety over lay adjudication of patent disputes goes to the very origins of the U.S. patent system. Thomas Jefferson, a leading architect of that system, once observed that for judges, the task of determining the validity of a patent "is but little analogous to their course of reading, since we might in vain turn over all the lubberly volumes of the law to find a single ray which would lighten the path of the Mechanic or Mathematician."[36]

Since that time, judges have frequently doubted their own ability to adjudicate patent cases. In a case involving extracted and purified adrenaline, the venerable Judge Learned Hand famously remarked, "I cannot stop without calling attention to the extraordinary condition of the law which makes it possible for a man without any knowledge of even the rudiments of chemistry to pass upon such questions as these."[37] Recently, a district court judge ruling

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that forty-eight percent of four hundred state court judges believed their education left them inadequately prepared to handle the range of scientific evidence arising in their courtrooms); *id.* at 451-53 (concluding that survey results suggest "limitations in the judiciary's understanding of science"); Kovera & McAuliff, *supra* note 24, at 578-79 (reporting that eighteen percent of 144 Florida judges surveyed had an undergraduate degree in "the natural sciences or psychology"). By comparison, considering only academic degrees conferred, it appears that at least seven out of fifteen judges of the Court of Appeals for the Federal Circuit have an educational background in science or engineering. *See Judicial Biographies*, U.S. CT. APPEALS FOR FED. CIR., http://www.cafc.uscourts.gov (follow "Judges" hyperlink under "The Court") (last visited Sept. 6, 2010).

33. The Patent and Trademark Office (PTO), a specialized administrative agency, processes patent applications. However, once the PTO has granted a patent, parties generally rely on district courts to enforce their rights, either by suing another party for infringement or seeking a judicial declaration of patent invalidity or noninfringement.

34. Stephen Breyer, *Introduction* to FED. JUDICIAL CTR., REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 1, 3 (2d ed. 2000); *see also* Jeffrey W. Stempel, *A More Complete Look at Complexity*, 40 ARIZ. L. REV. 781, 794 (1998) (noting the factually complex nature of patent infringement suits).

35. *See* Rai, *supra* note 15, at 1040 ("Generalist trial judges, and the juries empanelled by trial judges, may be overwhelmed by the technology involved in patent cases.").

36. Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), *in* 6 THE PAPERS OF THOMAS JEFFERSON: RETIREMENT SERIES 379, 384 (J. Jefferson Looney ed., 2009).

37. Parke-Davis & Co. v. H.K. Mulford Co., 189 F. 95, 115 (C.C.S.D.N.Y. 1911), *aff'd in part, rev'd in part*, 196 F. 496 (2d Cir. 1912). Tellingly, Judge Hand believed that specialized adjudicators were better equipped than generalist judges to handle technologically complicated disputes. Dreyfuss, *The Federal Circuit*, *supra* note 15, at 2.

on the patentability of genes echoed these same sentiments.[38] Trial courts must frequently rely on experts to learn complex new technologies.[39] According to Judge Patti Saris of the District of Massachusetts, "[T]rial judges claim that they dislike patent litigation, partly because it is hard."[40] Even Supreme Court Justices have recognized the unique challenges of patent adjudication.[41]

In many respects, the complexities of patent doctrine itself, which is rather arcane, exacerbate judicial engagement with technology.[42] For example, the patent concept of nonobviousness is particularly hard to grasp. This requirement holds that an invention must not have been obvious to a "person having ordinary skill in the art" (PHOSITA) at the time of invention in order to qualify for a patent.[43] The statutory standard is explicitly framed relative to a technical artisan, not a reasonable person or a legally trained judge.[44] Referring to "originality," a historical precursor to nonobviousness, Justice Frankfurter

38. Ass'n for Molecular Pathology v. U.S. Patent & Trademark Office, No. 09 Civ. 4515, 2010 WL 1233416, at *39 n.46 (S.D.N.Y. Mar. 29, 2010) ("This author, confronted by genomics and molecular biology, also emphatically empathizes with Judge Hand's complaint in *Parke-Davis* about his lack of knowledge of the rudiments of chemistry.").

39. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1474 (Fed. Cir. 1998) (in banc) (Rader, J., dissenting in part, concurring in the judgment, and joining in part).

40. O'Malley et al., *supra* note 1, at 682 (statement of Hon. Patti Saris).

41. *See, e.g.*, Blonder-Tongue Labs., Inc. v. Univ. of Ill. Found., 402 U.S. 313, 331 (1971) ("[P]atent litigation can present issues so complex that legal minds, without appropriate grounding in science and technology, may have difficulty in reaching decision."); Marconi Wireless Tel. Co. v. United States, 320 U.S. 1, 60-61 (1943) (Frankfurter, J., dissenting in part) ("It is an old observation that the training of Anglo-American judges ill fits them to discharge the duties cast upon them by patent legislation."); Tony Dutra, *Michel Gives Final 'State of the Court' Report, Roberts Calls IP Cases 'Challenging,'* 80 Pat. Trademark & Copyright J. (BNA) No. 1968, at 119, 119 (May 28, 2010) ("My colleagues and I feel very fortunate that the Federal Circuit stands between us and those difficult [patent] disputes.") (statement of Chief Justice John G. Roberts, Jr.).

42. *Cf.* Giles S. Rich, *The Relation Between Patent Practices and the Anti-Monopoly Laws, Part II*, 24 J. PAT. OFF. SOC'Y 159, 160 (1942) ("[F]ederal judges . . . almost invariably ascend the bench with no knowledge of the patent law they must administer.").

43. 35 U.S.C. § 103(a) (2006). This difficulty is compounded by varying levels of skill in various arts. According to Federal Circuit jurisprudence, biotechnology is an "unpredictable" art while computer science is apparently "predictable." *See* Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155, 1157 (2002).

44. *See* Burk & Lemley, *supra* note 43, at 1196 ("[J]udges are at a rather serious disadvantage in trying to put themselves in the shoes of an ordinarily skilled scientist."); Rebecca S. Eisenberg, *Obvious to Whom? Evaluating Inventions from the Perspective of PHOSITA*, 19 BERKELEY TECH. L.J. 885, 887 (2004); Kimberly A. Moore, *Are District Court Judges Equipped To Resolve Patent Cases?*, 15 HARV. J.L. & TECH. 1, 6 (2001); *cf.* Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535, 1551-52 (1998) (questioning the ability of generalist judges to evaluate scientific evidence).

remarked that "so long as the Congress . . . makes the determination of originality a judicial function, judges must overcome their scientific incompetence as best they can."[45] The canonical case interpreting the modern nonobviousness requirement, *Graham v. John Deere Co.*, also notes the difficulties of adjudicating nonobviousness.[46] While the subject matter of patent cases is often technologically complex, patent doctrine *itself* renders this a particularly difficult area of law to apply.[47]

Commentators have also questioned the ability of generalist judges to understand patented technologies.[48] One study conducted by then-Professor Kimberly Moore (now a Federal Circuit judge) focused on claim construction, the process by which judges interpret the claims that define the scope of a patented invention.[49] It found that "district court judges improperly construe patent claim terms in 33% of the cases appealed to the Federal Circuit."[50] Because of those errors, 81% of those decisions were reversed or vacated.[51] In a follow-up study, Professor Moore found that the reversal rate for appealed claim terms from 1996 to 2003 was 34.5%.[52] Of course, improper claim construction may arise from a number of factors besides poor comprehension of technology. Federal Circuit reversals may reflect vagaries in the law of claim construction or poor drafting by patent attorneys. Nevertheless, the high reversal rate "creates doubt about the abilities of district court judges to

45. *Marconi Wireless Tel. Co.*, 320 U.S. at 61 (Frankfurter, J., dissenting in part).

46. 383 U.S. 1, 36 (1966).

47. Professor Arti Rai's observations on patent examination by the PTO are equally applicable to courts: "Proper evaluation requires understanding not only the science in the area in which the patent is sought but also the manner in which the patent statute applies to the science." Arti K. Rai, *Growing Pains in the Administrative State: The Patent Office's Troubled Quest for Managerial Control*, 157 U. PA. L. REV. 2051, 2052 (2009).

48. *See, e.g.*, Dreyfuss, *What the Federal Circuit Can Learn*, *supra* note 15, at 797; John Shepard Wiley Jr., *Copyright at the School of Patent*, 58 U. CHI. L. REV. 119, 183 (1991) ("Patent law's technological focus is forbidding to most lawyers and judges.").

49. Moore, *supra* note 44; *see* 35 U.S.C. § 112, para. 2 (2006).

50. Moore, *supra* note 44, at 2. Moore assumes that Federal Circuit claim constructions are "correct," which she acknowledges is not always the case. *Id.* at 17-21. However, while the Federal Circuit exhibits some inconsistencies in its claim constructions, Moore reasonably concludes that high reversal rates suggest that district courts are incorrectly interpreting a significant proportion of claims. *Id.*

51. *Id.* at 2.

52. Kimberly A. Moore, Markman *Eight Years Later: Is Claim Construction More Predictable?*, 9 LEWIS & CLARK L. REV. 231, 233 (2005). The reversal rate for means-plus-function claims, which tend to be more technical, is even higher at 39.3%. *Id.* at 242.

adjudicate complex technical patent cases."[53] Professor David Schwartz has extensively studied district court claim construction and found no evidence that increased experience by judges significantly improves outcomes.[54]

A brief foray into copyright law further illustrates the difficulties posed by technological subject matter. Like patent law, copyright law requires judges to draw difficult lines between protectable and nonprotectable subject matter. The most notorious of these distinctions is the idea/expression dichotomy,[55] by which copyright protection only extends to the particularized "expression" of a work (and minor variations of it) and not to general "ideas."[56] The principal expositor of the idea/expression dichotomy, Judge Learned Hand, fully acknowledged that the test is inherently arbitrary.[57] Nevertheless, he felt comfortable drawing such distinctions, "evidently regard[ing] himself as 'a person having ordinary skill in the art to which the subject matter pertains.'"[58] As Professor John Shepard Wiley argues, "These confident judgments bespeak both familiarity with literary tradition and the judge's faith in his own powers of literary analysis."[59] While difficult line drawing is intrinsic to adjudication,

53. Moore, *supra* note 44, at 3; *see also* Christian A. Chu, *Empirical Analysis of the Federal Circuit's Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075, 1106 (2001) (suggesting that difficulties associated with lay understanding of technology contribute to high claim construction reversal rates); Wagner & Petherbridge, *supra* note 15, at 1127 ("[A] high reversal rate could indicate that nonspecialized district courts are simply unsuited to the often complex technological task of claim construction.").

54. David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223 (2008). However, in certain areas of patent litigation outside of claim construction, empirical evidence suggests that specialized experience by district judges decreases the probability of reversal on appeal. Jay P. Kesan & Gwendolyn G. Ball, The Impact of General and Patent-Specific Judicial Experience on the Efficiency and Accuracy of Patent Adjudication (Ill. Law & Econ. Research Paper Series, Research Paper No. LE10-006, 2010), *available at* http://ssrn.com/abstract=1596308.

55. *See* Leslie A. Kurtz, *Speaking to the Ghost: Idea and Expression in Copyright*, 47 U. MIAMI L. REV. 1221, 1222 (1993); Wiley, *supra* note 48, at 121; Alfred C. Yen, *A First Amendment Perspective on the Idea/Expression Dichotomy and Copyright in a Work's "Total Concept and Feel,"* 38 EMORY L.J. 393, 403 (1989).

56. Kurtz, *supra* note 55. Thus, for example, Shakespeare could have copyrighted the text of *Romeo and Juliet* but not the general idea of a romance between star-crossed lovers.

57. Nichols v. Universal Pictures Corp., 45 F.2d 119, 122 (2d Cir. 1930); *see also* Nash v. CBS, Inc., 899 F.2d 1537, 1540 (7th Cir. 1990) (noting that Judge Hand's test is "not a 'test' at all" but rather "a clever way to pose the difficulties that . . . . does little to help resolve a given case").

58. Wiley, *supra* note 48, at 161.

59. *Id.* at 162.

judges are more comfortable doing so when the relevant subject matter—literary texts—hews closer to the familiar realm of legal analysis.[60]

However, even within copyright, technical complexity poses special challenges for lay judges. While copyright traditionally covers books, paintings, and other familiar media, extending copyright protection to software[61] introduced palpable discomfort for courts. Software has strained existing copyright doctrines, such as the substantial similarity test for determining improper appropriation in an infringement action.[62] *Arnstein v. Porter*, a case involving sound recordings by Cole Porter, articulates the general rule that factfinders should determine the substantial similarity of protected and allegedly infringing works from the perspective of the ordinary layperson, without the benefit of expert testimony.[63] However, in *Computer Associates v. Altai*, the Second Circuit allowed expert testimony to inform the substantial similarity determination for copyrighted software.[64] In doing so, it noted "the reality that computer programs are likely to be somewhat impenetrable by lay observers—whether they be judges or juries—and, thus, seem to fall outside the category of works contemplated by those who engineered the *Arnstein* test."[65] Even in the copyright realm, technological complexity challenges generalist courts.[66]

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60. Of course, this is a claim about copyright jurists' *comfort* with line-drawing, not necessarily their accuracy. In the absence of objective standards, it is difficult to assess the accuracy of judicial application of the idea/expression dichotomy and related doctrines.

61. *See* NAT'L COMM'N ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT (1978).

62. Traditionally, infringement analysis consists of two prongs: (1) determining whether the defendant copied from the plaintiff, and (2) if so, whether the copying constitutes improper appropriation. ROBERT P. MERGES, PETER S. MENELL & MARK A. LEMLEY, INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE 524 (5th ed. 2010). In most contexts, improper appropriation is found where there is "substantial similarity" between the copied material and the plaintiff's protected expression. Ringgold v. Black Entm't Television, Inc., 126 F.3d 70, 74 (2d Cir. 1997); MERGES ET AL., *supra*, at 524.

63. 154 F.2d 464, 468 (2d Cir. 1946).

64. Computer Assocs. Int'l, Inc. v. Altai, Inc., 982 F.2d 693 (2d Cir. 1992).

65. *Id.* at 713.

66. *See* Apple Computer, Inc. v. Microsoft Corp., 35 F.3d 1435, 1442-43, 1445 (9th Cir. 1994); Gates Rubber Co. v. Bando Chem. Indus., 9 F.3d 823, 834 (10th Cir. 1993); *Computer Assocs. Int'l*, 982 F.2d at 696 ("As scientific knowledge advances, courts endeavor to keep pace, and sometimes—as in the area of computer technology—they are required to venture into less than familiar waters."); Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CALIF. L. REV. 1, 50 (2001); *see also* Anthony L. Clapes, *Confessions of an Amicus Curiae: Technophobia, Law, and Creativity in the Digital Arts*, 19 U. DAYTON L. REV.

Of course, any suggestion that lay judges routinely misunderstand complex technologies must be taken with a grain of salt. Many district judges are quite comfortable with scientific subject matter. Returning to patent law, forum shopping and regional differences have produced a highly uneven distribution of patent litigation around the country.[67] Therefore, some districts have developed significant expertise in patent cases, and judges there may be well versed in cutting-edge technologies. However, the "average" district judge receives only a few patent cases per year and handles a patent trial only once every seven years.[68] As noted, many district judges express discomfort with complex technologies, and district courts misinterpret claims in a third of cases appealed to the Federal Circuit.[69] Additionally, experimental studies have confirmed the existence of a hindsight bias that skews determinations of nonobviousness.[70] Furthermore, empirical evidence suggests that, if anything, patents and the patent system are growing in complexity.[71] All of this portends a future in which district judges will continue to struggle to understand patented inventions.

While this Article focuses on the technological anxieties of district judges, a brief consideration of juries corroborates this phenomenon. Even outside of patent law, critics have questioned jurors' ability to understand scientific evidence.[72] These concerns are amplified in patent cases, which are "suffused

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903, 926 (1994) ("The entire description of the nature of computer programs in the [*Computer Associates*] opinion is wrong.").

67. *See* Norman H. Beamer & Janise Lee, *Freedom of Choice*, RECORDER (LITIG. SUPP.) (S.F.), Autumn 2009, at 3, 3 (finding that seven of eighty-seven districts account for half of all patent infringement filings); Kimberly A. Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, 79 N.C. L. REV. 889, 892 (2001).

68. Neil E. Graham, *Specialized Patent Trial Court, Judges, Debated at House Hearing on Patent Reform*, 70 Pat. Trademark & Copyright J. (BNA) No. 1740, at 657 (Oct. 14, 2005).

69. *See* Moore, *supra* note 44, at 2.

70. *See* Gregory N. Mandel, *Patently Non-Obvious: Empirical Demonstration that the Hindsight Bias Renders Patent Decisions Irrational*, 67 OHIO ST. L.J. 1391, 1393 (2006).

71. *See* John R. Allison & Mark A. Lemley, *The Growing Complexity of the United States Patent System*, 82 B.U. L. REV. 77 (2002).

72. CARNEGIE COMM'N, *supra* note 6, at 11. Courts have even considered a "complexity exception" to the Seventh Amendment guarantee of a trial by jury in scientifically complicated cases. *See In re* Japanese Elec. Prods. Antitrust Litig., 631 F.2d 1069, 1079-80 (3d Cir. 1980); Brewer, *supra* note 44, at 1673-76. In the wake of the Supreme Court's decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), several psychological studies cast doubt on the ability of jurors to understand and evaluate expert evidence. Although these studies do not deal with *scientific* evidence per se, they illustrate cognitive burdens imposed by technical information. *See, e.g.*, Lora M. Levett & Margaret Bull Kovera, *The Effectiveness of Opposing Expert Witnesses for Educating Jurors About*

with complicated findings of scientific fact."[73] Judges,[74] commentators,[75] and practitioners[76] have all questioned the ability of juries to resolve technological disputes. These concerns underlie proposals to eliminate juries from patent cases[77] and establish specialized trial courts for such disputes.[78] While district judges possess specialized legal training, they, like most jurors, are generally laypersons in terms of technological sophistication. Ultimately, lay actors in the patent system, including district judges, experience difficulties in understanding the technologies at the heart of patent cases.[79]

B. Traditional Proposals To Ameliorate Cognitive Burdens

The difficulties of generalist judges adjudicating patent cases have spurred numerous proposals for reform. Unfortunately, all have clear limitations. One obvious approach is to enhance the technical knowledge of judges through training and education. Indeed, the Federal Judicial Center provides training to

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Unreliable Expert Evidence, 32 LAW & HUM. BEHAV. 363 (2008); Bradley D. McAuliff, Margaret Bull Kovera & Gabriel Nunez, *Can Jurors Recognize Missing Control Groups, Confounds, and Experimenter Bias in Psychological Science?*, 33 LAW & HUM. BEHAV. 247 (2009); Bradley D. McAuliff & Tejah D. Duckworth, *I Spy with My Little Eye: Jurors' Detection of Internal Validity Threats in Expert Evidence*, LAW & HUM. BEHAV., Feb. 17, 2010, http://www.springerlink.com/content/co116115l35j0426/fulltext.pdf.

73. Arti K. Rai, *Specialized Trial Courts: Concentrating Expertise on Fact*, 17 BERKELEY TECH. L.J. 877, 897 (2002).

74. *See Judicial Panel Discussion on Science and the Law*, 25 CONN. L. REV. 1127, 1145 (1993) ("Honest to God, I don't see how you could try a patent matter to a jury. Goodness, I've gotten involved in a few of these things. It's like somebody hit you between your eyes with a four-by-four. It's factually so complicated.") (statement of Hon. Alfred V. Covello). Again, the role of juries in copyright cases offers an illuminating comparison. *See* Whelan Assocs. v. Jaslow Dental Lab., Inc., 797 F.2d 1222, 1232 (3d Cir. 1986) ("The ordinary observer test, which was developed in cases involving novels, plays, and paintings, and which does not permit expert testimony, is of doubtful value in cases involving computer programs on account of the programs' complexity and unfamiliarity to most members of the public.").

75. *See* Wiley, *supra* note 48, at 144 ("Laypersons are easily awed by technological matters unimpressive to those trained in a particular field.").

76. *See* Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 369-73 (2000).

77. *See generally Fourth Biennial Patent System Major Problems Conference: Abolition of Jury Trials in Patent Cases*, 34 IDEA 77 (1994) [hereinafter *Patent System Major Problems*] (surveying issues and controversies related to eliminating or modifying jury trials in patent cases).

78. *See* Rai, *supra* note 73, at 897.

79. *See* Stempel, *supra* note 34, at 832 ("When faced with *factually technical* issues, courts may be at their competence ebb tide.").

district judges in scientific matters.[80] However, providing effective education for time-strapped judges can be quite difficult.[81] Furthermore, given the specialized nature of scientific knowledge, training in particular disciplines would be necessary on a case-by-case basis.

More ambitiously, commentators have recommended appointing district judges with scientific expertise. Addressing legal areas beyond patent law, Professor Scott Brewer has proposed a "two hat" system in which judges trained in both law and scientific methodology would evaluate the admissibility of scientific expert testimony.[82] However, while scientific *methodology* is largely transcendent, most of the difficulties of patent law arise from field-specific knowledge; a judge trained in biotechnology might know very little about computer science. Along related lines, Congress has in fact considered a pilot program to create patent expert judges in various districts.[83] However, the prospects of implementing and expanding such a program are uncertain. At the far end of the spectrum, commentators have advocated creating science courts comprised of scientifically trained judges and juries.[84] Such aggressive institution building would, of course, constitute a significant reform and would give rise to serious concerns over undue judicial specialization.[85]

Other proposals focus not on enhancing the technical capacity of district judges per se, but on making expert resources readily available to them. For example, district courts sometimes employ special masters with scientific expertise.[86] However, this "extraordinary" intervention is quite rare.[87]

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80. *See generally* FED. JUD. CENTER, http://www.fjc.gov/public/home.nsf (search for "science") (last visited Sept. 6, 2010) (describing various science education programs available to federal judges).

81. *See* CARNEGIE COMM'N, *supra* note 6, at 46.

82. Brewer, *supra* note 44, at 1677-79.

83. H.R. 628, 111th Cong. (2009); *see* Zahorsky, *supra* note 5; *see also* Adam D. Swain, Comment, *Getting with the (Patent) Program: How Congress Can Make H.R. 34 More Effective in Four Easy Steps*, 10 TUL. J. TECH. & INTELL. PROP. 319 (2007) (commenting on an earlier version of the proposed legislation).

84. *See* Rai, *supra* note 73. By comparison, in Germany, a Federal Patent Court with panels comprised of three technical experts hears patent invalidity cases. Swain, *supra* note 83, at 330.

85. Such concerns arose when Congress debated the creation of the Court of Appeals for the Federal Circuit. *See, e.g.*, S. REP. NO. 97-275, at 40-41 (statement of Sen. Max Baucus) (1981); *see also infra* notes 126-131 and accompanying text (discussing the formation of the Federal Circuit).

86. JAY P. KESAN & GWENDOLYN G. BALL, FED. JUDICIAL CTR., A STUDY OF THE ROLE AND IMPACT OF SPECIAL MASTERS IN PATENT CASES 4 (2009); *see also* Craig Allen Nard, *A Theory of Claim*

Furthermore, the range of functions performed by special masters is quite narrow, usually confined to managing discovery and claim construction.[88] Special masters thus do not represent a promising broad-based solution to address cognitive burdens in the patent system. Furthermore, while Federal Circuit judges routinely employ scientifically trained clerks,[89] it is highly unlikely that district judges would prioritize this attribute in hiring decisions. It should be noted that litigating parties themselves play an important role in educating courts about patented technologies, primarily through expert witnesses. Clearly, however, such education may be biased and incomplete.

Rather than focusing on information *processors*—the judges who handle patent cases—other proposals focus on simplifying information inputs themselves. Theoretically, courts, Congress, or the Patent and Trademark Office (PTO) could attempt to simplify the technical content of patents. For example, a "plain language" requirement for patent applications could reduce the use of confusing jargon.[90] However, given the highly technical nature of cutting-edge inventions, esoteric terms of art are simply indispensable. In addition, such a "plain language" requirement would conflict with longstanding patent doctrine. In large part, the target audience of patents is not the lay reader (or generalist judge) but the PHOSITA.[91] As a result, use of technical terms is altogether appropriate.[92] Furthermore, even if the language of patents were simplified, their surrounding technological context would still remain quite challenging. Given the inherent complexity of technology, the

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Interpretation, 14 HARV. J.L. & TECH. 1, 63 (2000) (discussing several mechanisms available to aid judicial claim construction, including appointing special masters).

87. Schwarzer, *supra* note 25, at 4; *see* THOMAS E. WILLGING ET AL., FED. JUDICIAL CTR., SPECIAL MASTERS' INCIDENCE AND ACTIVITY: REPORT TO THE JUDICIAL CONFERENCE'S ADVISORY COMMITTEE ON CIVIL RULES AND ITS SUBCOMMITTEE ON SPECIAL MASTERS 16 (2000) (finding that parties only formally considered appointing a special master in about 0.27% of patent cases).

88. KESAN & BALL, *supra* note 86, at 6.

89. *See* Burk & Lemley, *supra* note 43, at 1197 n.180; Moore, *supra* note 44, at 18.

90. *See* ROBIN FELDMAN, THE ROLE OF SCIENCE IN LAW 179-82 (2009).

91. *See* 35 U.S.C. § 112 (2006) ("The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains . . . to make and use the same . . . ."); Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). *But see* John M. Golden, *Construing Patent Claims According to Their "Interpretive Community": A Call for an Attorney-Plus-Artisan Perspective*, 21 HARV. J.L. & TECH. 321, 334 (2008) (arguing that the "primary audience" of patent claims "is united more by commercial interest and legal duty than by technological expertise").

92. On a related note, plain language patents would be very difficult to search, as they would lack the specialized nomenclature commonly used in technical fields.

limitations of language, and the doctrinal standard for evaluating patents, simplifying informational inputs is not a promising solution.

Finally, it bears mentioning that the PTO plays an important role in facilitating lay adjudication of patent disputes. This specialized administrative agency conducts the highly technical task of patent examination, and patents that survive such examination enjoy a statutory presumption of validity. This presumption—as well as the voluminous documentation produced by the PTO—may be extremely helpful to judges when evaluating the validity of a patent in litigation. Not surprisingly, some have advocated a greater role for exploiting the PTO's expertise in the patent system.[93] For example, one proposal would enable courts to obtain "administrative opinions" on claim construction from the PTO.[94] This proposal parallels the practice of several foreign countries that use administrative claim interpretations in patent enforcement actions.[95] While I am sympathetic to this proposal, the prospects of implementing it in the near future are far from certain. Furthermore, even under such a proposal, courts would still handle other technical areas of patent litigation, such as infringement determinations, without the benefit of direct PTO input.

This brief survey reveals that prevailing proposals face a number of shortcomings. However, this Article reveals deeper, systemic mechanisms by which the patent system facilitates the intersection of legal and technological cultures. To explore these mechanisms, it is useful first to consider the psychology of technological engagement.

II. THE PSYCHOLOGY OF TECHNOLOGICAL ENGAGEMENT: INFORMATION COSTS AND THE COGNITIVE MISER

The previous Part argued that science and technology impose special difficulties on generalist judges handling patent cases. This Part sheds new light on this phenomenon by examining the psychology of technological engagement. Drawing on the influential "cognitive miser" model, this Part shows that laypersons often utilize heuristics and defer to expert opinion to reduce the burdens of processing technical information. Because little research

93. *Cf.* Dickinson v. Zurko, 527 U.S. 150 (1999) (imposing a more deferential standard to govern Federal Circuit review of PTO factual findings, based partly on the PTO's technical expertise).

94. John F. Duffy, *On Improving the Legal Process of Claim Interpretation: Administrative Alternatives*, 2 WASH. U. J.L. & POL'Y 109, 136-48 (2000).

95. *Id.* at 148-56.

directly addresses the psychology of patent adjudication, the relevance of the following studies to patent law is necessarily inferential. Nevertheless, they reveal the strong tendency for laypersons to mitigate the "costliness" of technological engagement.

Thinking is expensive. A historically influential theory from social psychology posits that people function as "cognitive misers" who are limited in their capacity to process information and often seek shortcuts to reduce mental burdens.[96] Of course, people do not conserve cognitive resources in *all* circumstances. Studies in attitude formation have posited a heuristic-systematic model of cognition that differentiates between two types of information processing.[97] In "systematic" processing, individuals exert considerable cognitive effort to understand information inputs. In "heuristic" processing, on the other hand, individuals rely on more easily accessible factors such as the identity of the information source or other "cues" to reach conclusions.[98] Critically, individuals are more likely to engage in systematic

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96. SUSAN T. FISKE & SHELLEY E. TAYLOR, SOCIAL COGNITION: FROM BRAINS TO CULTURE 13 (2008); *see* David H. Ebenbach & Dacher Keltner, *Power, Emotion, and Judgmental Accuracy in Social Conflict: Motivating the Cognitive Miser*, 20 BASIC & APPLIED SOC. PSYCHOL. 7, 7 (1998); Hui Liu & Susanna Priest, *Understanding Public Support for Stem Cell Research: Media Communication, Interpersonal Communication and Trust in Key Actors*, 18 PUB. UNDERSTANDING SCI. 704, 704-05 (2009) (reviewing prior studies on the "cognitive miser" model); *see also* Kovera & McAuliff, *supra* note 24, at 575 (citing studies on heuristic processing). In exploring the cognitive miser model, it is important to acknowledge that it is only one of several theories of cognition. *See* FISKE & TAYLOR, *supra*, at 10-14 (surveying the historical progression of various theories). Contemporary refinements to cognitive theory posit that actors consciously and subconsciously select from a variety of information-processing schemes, including the cognitive miser model. 2 THE HANDBOOK OF SOCIAL PSYCHOLOGY 363 (Daniel T. Gilbert, Susan T. Fiske & Gardner Lindzey eds., 4th ed. 1998). While recent research has challenged, refined, and extended the cognitive miser theory, studies continue to show that it captures human cognition in many situations; it seems particularly applicable where lay judges handle technologically complex patent cases.

97. *See* Shelly Chaiken, *Heuristic Versus Systematic Information Processing and the Use of Source Versus Message Cues in Persuasion*, 39 J. PERSONALITY & SOC. PSYCHOL. 752, 752 (1980); Levett & Kovera, *supra* note 72, at 365; *cf.* Chris Guthrie, Jeffrey J. Rachlinski & Andrew J. Wistrich, *Blinking on the Bench: How Judges Decide Cases*, 93 CORNELL L. REV. 1, 6-9 (2007) (differentiating between "System 1" (intuitive) and "System 2" (deliberate) modes of reasoning).

98. Chaiken, *supra* note 97, at 752. A similar theoretical construct, the "elaboration likelihood model," distinguishes between "central" persuasion, which is based on substantive issue engagement, and "peripheral" persuasion, which is based on positive and negative cues. *See* RICHARD E. PETTY & JOHN T. CACIOPPO, ATTITUDES AND PERSUASION: CLASSIC AND CONTEMPORARY APPROACHES 262-68 (1981); Levett & Kovera, *supra* note 72, at 365; Richard E. Petty & John T. Cacioppo, *The Elaboration Likelihood Model of Persuasion*, 19 ADVANCES EXPERIMENTAL SOC. PSYCHOL. 123, 125 (1986); Richard E. Petty, John. T. Cacioppo & Rachel

processing when they are highly *motivated* and have the *ability* to understand relevant information.[99] Conversely, where motivation (as measured by personal relevance) or ability is low, people are more likely to conserve cognitive resources.[100]

The cognitive miser model is particularly salient to lay engagement with technology. Studies confirm that technological complexity imposes significant burdens on laypersons;[101] these burdens impair both learning and performance.[102] Drawing from the model described above, technical ability and personal relevance are likely to be low when generalist judges adjudicate patent cases involving complex technologies.[103] As such, conditions favor the adoption of cognitive shortcuts to streamline information processing. Two mechanisms by which laypersons commonly economize on information costs are heuristics and deference to expert authority.

Studies in psychology and behavioral law and economics have long challenged classic rational choice models of cognition.[104] Among the most significant departures from rationality is the widespread use of heuristics to streamline (and sometimes distort) decisionmaking.[105] Heuristics are cognitive

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Goldman, *Personal Involvement as a Determinant of Argument-Based Persuasion*, 41 J. PERSONALITY & SOC. PSYCHOL. 847, 847-48 (1981).

99. Kovera & McAuliff, *supra* note 24, at 575; Levett & Kovera *supra* note 72, at 365; *see* McAuliff et al., *supra* note 72, at 248-49; Petty et al., *supra* note 98, at 852-54.

100. McAuliff et al., *supra* note 72, at 249.

101. While definitions are contested, studies indicate a high level of "technophobia" throughout the general population. M.J. Brosnan & S.J. Thorpe, *An Evaluation of Two Clinically-Derived Treatments for Technophobia*, 22 COMPUTERS HUM. BEHAV. 1080, 1081 (2006) (noting that about a third of all individuals in various studies experience "anxiety induced by Information Technology (IT), typically computers").

102. Stephanie A. Gore, *"A Rose by Any Other Name": Judicial Use of Metaphors for New Technologies*, 2003 J.L. TECH. & POL'Y 403, 414-15.

103. *Cf.* Guthrie et al., *supra* note 97, at 34 ("[E]rrors seldom have direct adverse consequences for judges – when the judge slips, the litigant falls.").

104. *See* Dennis D. Crouch, *The Patent Lottery: Exploiting Behavioral Economics for the Common Good*, 16 GEO. MASON L. REV. 141, 143-45 (2008); Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCIENCE 1124, 1130 (1974). *See generally* BEHAVIORAL LAW AND ECONOMICS (Cass R. Sunstein ed., 2000) (examining common departures from rational choice models and their legal implications).

105. *See* Lori H. Colwell, *Cognitive Heuristics in the Context of Legal Decision Making*, 23 AM. J. FORENSIC PSYCHOL., no. 2, 2005, at 17, 17; Cass R. Sunstein, *Introduction* to BEHAVIORAL LAW AND ECONOMICS, *supra* note 104, at 1, 3-5. Of course, viewed from one perspective, the use of heuristics may be quite rational to the extent it conserves scarce cognitive resources.

shortcuts that economize the selection and processing of information.[106] They particularly ease decisionmaking in situations of uncertainty.[107] Heuristics such as the representativeness, availability, and anchor-and-adjust biases are well documented in the psychological literature.[108] Research has shown that judges sometimes rely on heuristics.[109]

Heuristics are particularly salient in the evaluation of new technologies.[110] Consistent with the "cognitive miser" model, studies focusing on nanotechnology, stem cell research, and biotechnology reveal that laypeople typically function as "satisficers, who collect only as much information about a topic as they think is necessary to reach a decision."[111] Heuristics such as value orientations, media interpretations, general attitudes toward science, and estimations of trust play key roles in forming opinions of new technologies.[112]

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106. *See* Chris Guthrie, Jeffrey J. Rachlinski & Andrew J. Wistrich, *Inside the Judicial Mind*, 86 CORNELL L. REV. 777, 780 (2001).

107. *See* Benedetto De Martino et al., *Frames, Biases, and Rational Decision-Making in the Human Brain*, 313 SCIENCE 684, 684 (2006); Kovera & McAuliff, *supra* note 24, at 575. Even experienced researchers adopt heuristics. Tversky & Kahneman, *supra* note 104, at 1130.

108. *See, e.g.*, Tversky & Kahneman, *supra* note 104.

109. *See* Guthrie et al., *supra* note 97, at 3 ("[J]udges generally make intuitive decisions but sometimes override their intuition with deliberation."); Guthrie et al., *supra* note 106, at 783 ("[J]udges make decisions under uncertain, time-pressured conditions that encourage reliance on cognitive shortcuts that sometimes cause illusions of judgment."); Stempel, *supra* note 34, at 795-96. *See generally* Guthrie et al., *supra* note 106 (exploring anchoring, framing, hindsight biases, representative heuristics, and egocentric biases in judicial decisionmaking).

110. *See, e.g.*, Dominique Brossard & Matthew C. Nisbet, *Deference to Scientific Authority Among a Low Information Public: Understanding U.S. Opinion on Agricultural Biotechnology*, 19 INT'L J. PUB. OPINION RES. 24, 43 (2007).

111. *Id.* at 25; Dietram A. Scheufele & Bruce V. Lewenstein, *The Public and Nanotechnology: How Citizens Make Sense of Emerging Technologies*, 7 J. NANOPARTICLE RES. 659, 660 (2005); *cf.* Regula Valérie Burri, *Coping with Uncertainty: Assessing Nanotechnologies in a Citizen Panel in Switzerland*, 18 PUB. UNDERSTANDING SCI. 498, 508 (2009) (contending that citizens use "habitualized schemes of thinking" when evaluating new technologies); Colwell, *supra* note 105, at 32 ("Human beings are essentially asymmetrical information-processors—once they obtain confirming evidence of their original assumption, they are satisfied that they have done a thorough job and stop investigating.").

112. *See* Brossard & Nisbet, *supra* note 110, at 27; van Dijck, *supra* note 11, at 182-85; Dan M. Kahan, Hank Jenkins-Smith & Donald Braman, *Cultural Cognition of Scientific Consensus*, 14 J. RISK RES. (forthcoming 2011) (manuscript at 2-5), *available at* http://ssrn.com/abstract=1549444 (arguing that cultural values inform individuals' assessments of scientific debates and risks); Dan Kahan, *Fixing the Communications Failure*, 463 NATURE 296, 296 (2010) (same); Matthew C. Nisbet, Dominique Brossard & Adrianne Kroepsch, *Framing Science: The Stem Cell Controversy in an Age of Press/Politics*, 8 HARV. INT'L J. PRESS/POL., Apr. 2003, at 36, 38; Scheufele & Lewenstein, *supra* note 111, at 664-65.

One illustration of the "cognitive miser" model that is particularly relevant to adjudication is the use of metaphors to understand new technologies.[113] For example, judicial opinions have analogized cyberspace to physical space and applied traditional doctrines such as trespass to chattels to enjoin unauthorized access to computer systems.[114] While analogies may simplify the task of understanding, they may also misrepresent the technology at hand.[115]

Another manifestation of the cognitive miser model is deference to expert authority.[116] Rather than wrestle with understanding a complex technology, many people simply seek out expert opinions. Epistemologists suggest that deference to expertise is a rational means for the nonexpert to obtain technical "knowledge";[117] psychological research on public understanding of science confirms this phenomenon. One study found that American public opinion concerning biotechnology was "to some extent, 'pre-shaped' by a strong deference to scientific authority, a basic value predisposition cultivated by the nature of the American educational system."[118] Similarly, when evaluating the risks of this technology, individuals placed more importance on choosing expert institutions to trust rather than generating their own probabilistic accounts of harm.[119] Interestingly, deference to scientific authority is greater in older, highly educated males[120]—demographics that characterize a substantial number of federal district judges.

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113. Gore, *supra* note 102.

114. *See, e.g.*, eBay, Inc. v. Bidder's Edge, Inc., 100 F. Supp. 2d 1058, 1069-72 (N.D. Cal. 2000).

115. *See* Gore, *supra* note 102, at 448; Mark A. Lemley, *Place and Cyberspace*, 91 CALIF. L. REV. 521, 528-29 (2003).

116. As a general matter, psychologists have found that deference to expertise is higher when a cognitive task has a low degree of personal relevance or impact. Petty et al., *supra* note 98, at 853. Again, this is likely to be the case for district judges (and juries) endeavoring to understand technologies in the context of patent litigation.

117. *See* John Hardwig, *Epistemic Dependence*, 82 J. PHIL. 335, 343 (1985).

118. Brossard & Nisbet, *supra* note 110, at 29. Although one must draw inferences with caution, psychological research on obedience also suggests a strong general tendency to defer to scientific authority. *See* Stanley Milgram, *Behavioral Study of Obedience*, 67 J. ABNORMAL & SOC. PSYCHOL. 371 (1963) (finding test subjects highly obedient to scientists conducting apparently harmful research); Stanley Milgram, *Some Conditions of Obedience and Disobedience to Authority*, 18 HUM. REL. 57 (1965) (extending and analyzing obedience experiments); *see also* Thomas Blass, *The Milgram Paradigm After 35 Years: Some Things We Now Know About Obedience to Authority*, 29 J. APPLIED SOC. PSYCHOL. 955, 963-64 (1999) (suggesting that obedience to scientists arises in part because of their perceived expertise).

119. Brossard & Nisbet, *supra* note 110, at 33.

120. *Id.* at 38-39.

Turning to law, deference to scientific expertise is particularly relevant to lay assessments of scientific evidence. As Professor Brewer notes, "Lacking the information necessary to make cogent independent judgments about which of the competing scientific experts to believe, nonexpert legal decisionmakers choose among the experts by relying on such indicia of expertise as credentials, reputation, and demeanor."[121] Again, rather than grapple with the difficulties of understanding scientific evidence, laypersons tend to seek out and trust expert authority.[122]

In sum, when confronted with complex technologies, many nonexperts commonly adopt simplifying heuristics and defer to expert authority. Judges are not immune to these tendencies, and legal education may even reinforce them.[123] My aim is not to assess these mechanisms normatively so much as it is to describe them; the "cognitive miser" model is adaptive in some senses and potentially distorting in others. These studies, however, raise the provocative question of whether the "cognitive miser" model is reflected in the patent system. I explore this question in the next Part, with particular reference to formalism.[124]

III. AN INFORMATION-COST THEORY OF FEDERAL CIRCUIT PATENT DOCTRINE: FORMALISM AND TECHNOLOGICAL ENGAGEMENT

This Part draws from the preceding psychological principles to present an information-cost theory of patent doctrine. It focuses on the well-recognized formalistic nature of Federal Circuit patent jurisprudence. It argues that such formalism operates as a heuristic that lowers the cognitive burdens associated

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121. Brewer, *supra* note 44, at 1538.

122. For general observations on the tendency of legal actors to defer to scientific expertise, see FELDMAN, *supra* note 90, at 37-48.

123. Legal education, unlike training in psychology and medicine, cultivates a deterministic approach to problem solving in which statistical and probabilistic reasoning plays a relatively small role. *See* Kovera & McAuliff, *supra* note 24, at 584; Darrin R. Lehman, Richard O. Lempert & Richard E. Nisbett, *The Effects of Graduate Training on Reasoning: Formal Discipline and Thinking About Everyday-Life Events*, 43 AM. PSYCHOLOGIST 431, 438, 440 (1988).

124. In laying this foundation, I do not necessarily suggest that lay actors in the patent system utilize the *specific* heuristics and deferential mechanisms described here. Among other considerations, values-based heuristics are largely inapposite to the vast majority of patented inventions, from semiconductors to adjustable gas pedals, which do not elicit strong cultural reactions. Rather, my point is broader and simpler: technological complexity imposes cognitive burdens on nonexperts, which motivates the adoption of mechanisms to economize on information costs.

with lay adjudication of technological disputes. While familiar concerns such as uniformity and consistency often justify formalism, this Part argues that formalism is particularly salient to mediating the intersection of legal and technological cultures.[125]

As a prelude, it is first useful to explore a central institution in the development of formalistic patent doctrine: the United States Court of Appeals for the Federal Circuit.[126] In the late 1970s and early 1980s, Congress became increasingly concerned over differences among the regional circuit courts in the substance and application of patent law.[127] To enhance national uniformity, as well as to address other structural deficiencies,[128] Congress enacted the Federal Courts Improvement Act of 1982.[129] The Act created the Court of Appeals for the Federal Circuit, which merged the Court of Claims and the Court of Customs and Patent Appeals. The Act defines the Federal Circuit's jurisdiction substantively rather than geographically; it hears appeals in various disputes concerning patents, trademarks, tariffs and customs, technology transfer regulations, government contracts, and labor matters.[130] Notwithstanding this

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125. As Professor Arti Rai observes,

> [T]hough a few scholars have alluded to the Federal Circuit's tendencies towards de novo fact finding and bright-line rules, they have not discussed whether this behavior may be justified by the court's dependence on inferior decisionmakers of questionable competence in the realms of fact finding and factually oriented policy application.

Rai, *supra* note 15, at 1038-39. This Article helps to fill this void. While Professor Rai proposes a variety of institutional reforms, including the establishment of specialized trial courts, this Article focuses on the role of formalism and clear doctrinal frameworks in facilitating lay adjudication of technologically intensive patent disputes.

126. For extensive examinations of the Federal Circuit's origins and operations, see Dreyfuss, *The Federal Circuit*, *supra* note 15; Dreyfuss, *Continuing Experiment*, *supra* note 15; and Dreyfuss, *Institutional Identity*, *supra* note 15.

127. S. REP. NO. 97-275, at 3 (1981); H.R. REP. NO. 97-312, at 20-23 (1981).

128. *See* H.R. REP. NO. 97-312, at 17-18 (1981) (describing a "crisis" in the federal appellate caseload).

129. Pub. L. No. 97-164, 96 Stat. 25 (relevant provisions codified as amended in scattered sections of 28 U.S.C.).

130. Dreyfuss, *The Federal Circuit*, *supra* note 15, at 4; *see also* Paul R. Michel, *Foreword: Assuring Consistency and Uniformity of Precedent and Legal Doctrine in the Areas of Subject Matter Jurisdiction Entrusted Exclusively to the U.S. Court of Appeals for the Federal Circuit: A View from the Top*, 58 AM. U. L. REV 699, 699-700 (2009) (describing the Federal Circuit's appellate jurisdiction). Congressional reports explicitly emphasized that, due to its broad jurisdiction, the Federal Circuit is not a "specialized" court. H.R. REP. NO. 97-312, at 19 (1981).

broad jurisdiction, patent cases compose about thirty-five percent of the Federal Circuit's docket.[131]

As many have observed, Federal Circuit patent doctrine is highly formalistic.[132] In particular, as Professor John Thomas has pointed out, Federal Circuit case law is characterized by "adjudicative rule formalism," which relies on bright-line rules instead of flexible standards.[133] Federal Circuit jurisprudence has actually become more formalistic over time: where it once employed tests considering "all the facts and circumstances," the court now considers only discrete sets of factors.[134] Furthermore, rules have become "leaner" in that they have fewer components.[135] While the Federal Circuit's formalistic jurisprudence promotes predictability and certainty in patent adjudication,[136] it has also attracted criticism as undermining innovation policy.[137] Interestingly, the Federal Circuit tends to be formalistic not only in its substantive doctrine, but also in its reasoning. Unlike the approaches of several other appellate courts, the Federal Circuit rarely cites extralegal materials, such as empirical and economic scholarship, in its opinions.[138]

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131. U.S. COURT OF APPEALS FOR THE FED. CIRCUIT, ADJUDICATION BY MERITS PANELS, BY CATEGORY, FY 2008, http://www.cafc.uscourts.gov/images/stories/the-court/statistics/ChartAdjudicationso8.pdf (last visited Sept. 6, 2010).

132. *See* Timothy R. Holbrook, *Substantive Versus Process-Based Formalism in Claim Construction*, 9 LEWIS & CLARK L. REV. 123 (2005) [hereinafter Holbrook, *Substantive Versus Process-Based Formalism*]; Timothy R. Holbrook, *The Supreme Court's Complicity in Federal Circuit Formalism*, 20 SANTA CLARA COMPUTER & HIGH TECH. L.J. 1 (2003) [hereinafter Holbrook, *Supreme Court's Complicity*]; Craig Allen Nard & John F. Duffy, *Rethinking Patent Law's Uniformity Principle*, 101 NW. U. L. REV. 1619, 1644 (2007); Rai, *supra* note 15, at 1040; Thomas, *supra* note 15; *see also* Adam Mossoff, *Exclusion and Exclusive Use in Patent Law*, 22 HARV. J.L. & TECH. 321, 374 (2009) (suggesting that conceiving of patents as rights to exclude contributes to enforcing them by rules rather than standards).

133. Thomas, *supra* note 15, at 775-76.

134. *Id.* at 773.

135. *Id.* at 773-74.

136. *See* Holbrook, *Supreme Court's Complicity*, *supra* note 132, at 1.

137. Rai, *supra* note 15, at 1040 ("[T]he Federal Circuit has substituted formalist decisionmaking for the fact-specific, policy-oriented analysis that is required by the open-ended language of the patent statute."); *cf.* Dreyfuss, *What the Federal Circuit Can Learn*, *supra* note 15, at 803 ("[The Federal Circuit] rarely provides insight into the policy rationale for its own decisions.").

138. *See* Dreyfuss, *Continuing Experiment*, *supra* note 15, at 780-81; Nard, *supra* note 15, at 678-83. Interestingly, the Federal Circuit also appears to be formalistic in its understanding and application of science. *See* FELDMAN, *supra* note 90, at 30-31 (providing examples from molecular biology).

Before proceeding, it is useful to clarify what I mean by formalism, a concept subject to many connotations.[139] For the purposes of this Article, I define formalism as "decisionmaking according to *rule*."[140] Formalistic jurisprudence involves identifying and articulating bright-line rules as opposed to broader, more flexible standards. Notably, the primacy of rules "screen[s] off from a decisionmaker factors that a sensitive decisionmaker would otherwise take into account."[141] Formalistic adjudication is thus truncated. It relies on a limited set of hard-edged rules (preferably fewer rather than more) and excludes extraneous considerations in reaching decisions. As should be clear, the distinction between formalism and holism also intersects with the traditional legal dichotomy between rules and standards.[142] Formalism according to *rule* eschews discretionary, flexible standards.

This Part sheds light on the surprising role of formalism in mediating technologically complex legal disputes. It thus adds a novel dimension to the traditional debate on the merits and demerits of formalism, a topic of significant academic interest.[143] In advancing this descriptive theory of Federal Circuit doctrine, however, it is important to cabin and contextualize my claims. First, I make no claims about intentionality; I do not contend, for instance, that

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139. *See, e.g.*, Larry Alexander, *"With Me, It's All er Nuthin'": Formalism in Law and Morality*, 66 U. CHI. L. REV. 530, 531 (1999); Duncan Kennedy, *Form and Substance in Private Law Adjudication*, 89 HARV. L. REV. 1685 (1976); Frank I. Michelman, *A Brief Anatomy of Adjudicative Rule-Formalism*, 66 U. CHI. L. REV. 934 (1999); Richard H. Pildes, *Forms of Formalism*, 66 U. CHI. L. REV. 607 (1999); Frederick Schauer, *Formalism*, 97 YALE L.J. 509 (1988).

140. Schauer, *supra* note 139, at 510. These rules may be articulated in statute, and one conception of formalism refers to a mode of statutory interpretation that elevates textual fidelity over legislative intent and contextual factors. As we will see, an analogy could be drawn between this mode of statutory interpretation and Federal Circuit claim construction doctrine. *See infra* notes 146-162 and accompanying text. In general, however, I use formalism in a broader sense to refer to rule-based adjudication (including instances where rules arise from judge-made law).

141. Schauer, *supra* note 139, at 510.

142. *See, e.g.*, Pierre Schlag, *Rules and Standards*, 33 UCLA L. REV. 379 (1985).

143. *Compare* Kennedy, *supra* note 139, at 1688 (characterizing the "two great social virtues of formally realizable rules" as "restraint of official arbitrariness and certainty"), *with* Kelly Casey Mullally, *Patent Hermeneutics: Form and Substance in Claim Construction*, 59 FLA. L. REV. 333, 368 (2007) ("At best . . . the formalist approach to claim construction offered a superficially certain multi-step framework for performing a claim construction analysis."). For other analyses of formalism, see Thomas, *supra* note 15, at 774-75; and *supra* note 139. Again, many attributes of formalism, such as ex ante certainty, clarity, and reduced judicial discretion, are also associated with rules in the familiar "rules versus standards" debate. *See* Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 622 (1992); Schlag, *supra* note 142, at 383-90 (exploring the "Rules v. Standards Dialectic").

the Federal Circuit consciously creates formalistic doctrine to ease cognitive burdens on judges. Rather, formalism is probably best understood as a byproduct of the court's broader aim to unify patent law and make it more predictable. Second, by focusing on formalism as a methodological device, I do not argue that *substantive* Federal Circuit doctrine always decreases cognitive burdens for district judges; in some contexts, it clearly does not. Third, while I situate my analysis within the Federal Circuit's well-recognized tendency to produce formalistic doctrine, I acknowledge that some decisions depart from this trend.[144] Finally, as I will explore below, formalism operates in complex ways; there may be instances where formalistic doctrine simultaneously increases some cognitive burdens while reducing others.

With these caveats in place, I argue that Federal Circuit formalism is performing more work than initially meets the eye. In particular, I contend that this doctrinal methodology helps reduce information costs associated with lay engagement with technology.[145] In general, formalism truncates and circumscribes legal inquiries, thus decreasing the extent to which lay judges must engage technologically challenging subject matter. I illustrate this principle by examining four central concepts in patent law: claim construction, prosecution history estoppel, nonobviousness, and remedies.

A. Claim Construction

Claim construction offers a prime example of Federal Circuit formalism. All patents conclude with one or more claims, which are highly stylized sentences "particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention."[146] It is often said that claims define the "metes and bounds" of an invention.[147] Accordingly, claim construction—interpreting the meaning and scope of claims—often determines the outcome

144. *See, e.g.*, Hilton Davis Chem. Co. v. Warner-Jenkinson Co., 62 F.3d 1512 (Fed. Cir. 1995) (articulating a broad, functional approach to the doctrine of equivalents), *rev'd*, 520 U.S. 17 (1997).

145. *Cf.* A. Samuel Oddi, *Regeneration in American Patent Law: Statutory Subject Matter*, 46 IDEA 491, 495 (2006) ("[F]ormalism might play a significantly greater role in patent law because of its technological and legal nature."); Schlag, *supra* note 142, at 428 (describing the tendency of rule-based systems of knowledge to truncate inquiries and exclude context).

146. 35 U.S.C. § 112 (2006).

147. *See, e.g.*, *In re* Warmerdam, 33 F.3d 1354, 1360 (Fed. Cir. 1994).

of patent litigation.[148] Under prevailing doctrine, judges (rather than juries) perform this cognitively demanding task.[149]

As Professor Craig Allen Nard describes, over the past several decades, two competing approaches to claim construction have emerged within the Federal Circuit: "hypertextualism" and "pragmatic textualism."[150] Hypertextualism is "highly formalistic."[151] It focuses on the language of the claims rather than on extrinsic evidence, such as dictionary definitions, industry custom, and general scientific principles, to determine their meaning.[152] Pragmatic textualism places more weight on extrinsic evidence in construing claims.[153] Since the mid-1990s, the Federal Circuit has gradually moved toward the hypertextualist rather than the pragmatic textualist approach to claim construction.[154] This shift has been

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148. *See* Diamond v. Diehr, 450 U.S. 175, 205 (1981) (Stevens, J., dissenting); Markman v. Westview Instruments, Inc. (*Markman I*), 52 F.3d 967, 999 (Fed. Cir. 1995) (in banc) (Newman, J., dissenting), *aff'd*, 517 U.S. 370 (1996) (*Markman II*); Moore, *supra* note 44, at 8.

149. *Markman I*, 52 F.3d at 971, *aff'd*, 517 U.S. at 391. From one perspective, this appears to be an instance where substantive Federal Circuit doctrine affirmatively increased cognitive demands on judges. However, it is important to understand *Markman I* (as well as *Markman II*) as addressing the *relative* technical competence of judges and juries. The Federal Circuit assigned claim construction to judges based in significant part on judges' expertise in interpreting documents. *Id.* at 987. In so doing, concerns over the technological complexity of claim construction lay in the background. *See id.* at 993 (Mayer, J., concurring) (accusing the majority of creating a "complexity" exception to the right of trial by jury). The implicit view that judges can understand technological documents better than juries also played a role in the Supreme Court's *Markman II* affirmance. *See* 517 U.S. at 388-89. In this sense, the Federal Circuit and Supreme Court *Markman* decisions are consistent with a broad program of lowering the costs of lay engagement with technology. Neither judges nor juries are ideally equipped to construe claims; however, these decisions assign this technical task to the lay party (judges) better situated to perform it.

150. Nard, *supra* note 86. Professors Polk Wagner and Lee Petherbridge identify a different methodological split, which they characterize as "procedural" versus "holistic." Procedural claim construction is fairly rule-based and follows an established hierarchy of interpretative aids. Holistic claim construction is more free-form and case-specific, and it does not necessarily follow a strict hierarchy of interpretive sources. Wagner & Petherbridge, *supra* note 15, at 1111, 1133-34.

151. Nard, *supra* note 86, at 5.

152. *Id.* ("[Hypertextualism] stresses textual fidelity and internal textual coherence, but eschews extrinsic evidence as an interpretive tool, portraying its use as 'rarely, if ever,' proper.") (footnote omitted).

153. *Id.* at 6.

154. In *Markman II*, 517 U.S. 370, the Supreme Court affirmed the Federal Circuit's decision that claim construction is a question of law to be resolved by judges rather than juries. Following *Markman II*, the Federal Circuit seemed to favor intrinsic sources of evidence in claim construction. *See* Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1583 (Fed. Cir. 1996)

highly controversial, and all the more complicated because of a fair degree of methodological heterogeneity among the individual members of the Federal Circuit.[155]

Without wading into the debate over which approach is superior, I wish simply to highlight that hypertextualism decreases the degree to which district judges must engage technological context. Whether characterized as a merit or demerit, hypertextualism partially insulates both the district court judge and appellate judges from certain difficult, technologically intensive inquiries.[156] As Professor Kelly Mullally observes, "A formalist approach [to claim construction] strictly limits the universe of permissible interpretative sources. By contrast, a substantive approach allows a decision maker to consider a broader information set to determine meaning."[157] Hypertextualism "truncates" claim construction by deprioritizing extrinsic, highly technical information sources such as scientific treatises, expert testimony, and industry norms.

("[W]here the public record [(i.e., claims, written description, and prosecution history)] unambiguously describes the scope of the patented invention, reliance on any extrinsic evidence is improper."); Nard, *supra* note 86, at 19 (discussing *Vitronics*). *But see* Paul Michel, *Judicial Constellations: Guiding Principles as Navigational Aids*, 54 CASE W. RES. L. REV. 757, 766 (2004) (stating that *Vitronics*, which he authored, "does not stand for the proposition for which it is commonly cited" that "the district judge may not look at extrinsic evidence"). Under its popular interpretation, *Vitronics* represented a victory for hypertextualism over pragmatic textualism. However, several subsequent Federal Circuit decisions placed intrinsic and extrinsic evidence on equal footing. *See, e.g.*, *Fromson v. Anitec Printing Plates, Inc.*, 132 F.3d 1437 (Fed. Cir. 1997); *see also* Nard, *supra* note 86, at 26-27 (discussing *Fromson*). The Federal Circuit tried to resolve this debate in its in banc opinion in *Cybor Corp. v. FAS Technologies, Inc.*, which held that claim construction is a question of law to be reviewed de novo on appeal. 138 F.3d 1448 (Fed. Cir. 1998) (in banc). This holding suggested a diminished role for extrinsic evidence in claim construction. However, in *Texas Digital Systems, Inc. v. Telegenix, Inc.*, the court espoused consulting dictionaries first before considering the specification and prosecution history. 308 F.3d 1193, 1201-05 (Fed. Cir. 2002); *see* Mullally, *supra* note 143, at 354. Finally, in *Phillips v. AWH Corp.*, another en banc decision, the Federal Circuit held that judges were to attach greater weight to intrinsic evidence (such as the claims themselves, specification, and prosecution history) relative to extrinsic evidence (such as dictionaries, treatises, and expert testimony). 415 F.3d 1303, 1317 (Fed. Cir. 2005) (en banc); *see also* Wagner & Petherbridge, *supra* note 15, at 1112, 1148 (noting that the Federal Circuit is becoming more rules-based and that it favors proceduralism over holism).

155. *Cf.* Wagner & Petherbridge, *supra* note 15, at 1159-63 (situating individual judges along the proceduralist-holistic continuum).

156. *See* Nard, *supra* note 86, at 40 ("Unlike pragmatic textualism with its emphasis on context and consequences, hypertextualism fosters a disconnect between claim interpretation and industry practices . . . .").

157. *See* Mullally, *supra* note 143, at 340.

From one perspective, of course, this approach makes the judge's job more difficult: she may desire *more* context and information to guide her interpretation of patent claims. In particular, relying on general-purpose dictionaries to construe technical terms may seem to simplify the task of claim construction.[158] Furthermore, for pragmatic textualists, the PHOSITA operates as a valuable interpretive tool because "the artisan has knowledge of the underlying assumptions present in his technological community and is sensitive to the facts on the ground."[159]

However, from another perspective, the formalism embodied in hypertextualism is cognitively economical. Delineating the metes and bounds of a novel invention is an inherently difficult task;[160] this difficulty is compounded by the technological subject matter at hand. However, in a formalistic approach to claim construction, a judge need not master an entire body of unfamiliar technical material. Rather, she can focus primarily on information sources internal to the patent and its prosecution, notably the words of the patent itself. For example, a judge construing what "permanently affixed" means in a claim relating to in-line roller skates need not invest considerable energy to comprehend fully what an ordinary artisan of in-line skating would understand that term to mean.[161] Rather, she can rely primarily on her own interpretation of such claims based on the text before her. Formalism thus lowers the information costs associated with claim construction[162] by diminishing the importance of extrinsic, technical sources of information.

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158. *See Tex. Digital*, 308 F.3d at 1202 (establishing a presumption in favor of dictionary definitions of claim terms), *overruled by Phillips*, 415 F.3d at 1320 (holding that *Texas Digital* "placed too much reliance on extrinsic sources such as dictionaries, treatises, and encyclopedias and too little on intrinsic sources"). While reliance on general-purpose dictionaries may simplify claim construction, it sometimes produces absurd interpretations of claim terms. *See* Golden, *supra* note 91, at 325.

159. Nard, *supra* note 86, at 6.

160. *See* Henry E. Smith, *Institutions and Indirectness in Intellectual Property*, 157 U. PA. L. REV. 2083, 2094 (2009).

161. *See* K-2 Corp. v. Salomon S.A., 191 F.3d 1356, 1370 (Fed. Cir. 1999) (Rader, J., dissenting) ("[T]his court does not even consider the meaning an ordinary in-line skate artisan would attach to 'permanently.'"). The formalistic nature of claim construction has also influenced claim *drafting*. Patent claims tend to be long, detailed, and quite formalistic. *See* Mullally, *supra* note 143, at 374 ("[F]ormalist drafting implicitly recognizes the tension inherent in a generalist judge interpreting words from a specialized, technical standpoint. It is an effort to ease the obstacles facing judges in trying to stand in the place of a person of ordinary skill in the art.").

162. Notably, it represents but one of several judicial strategies for doing so. *See* Mark A. Lemley, *The Changing Meaning of Patent Claim Terms*, 104 MICH. L. REV. 101, 114 (2005) ("Busy

Federal Circuit formalism reduces technological engagement in other areas of patent doctrine beyond claim construction. The following Sections explore this phenomenon in prosecution history estoppel, nonobviousness, and remedies. Many of these doctrines have been recently modified or overturned by the Supreme Court, a development explored at length in Part IV. These doctrines, however, reveal the generally formalistic character of Federal Circuit jurisprudence and the tendency of formalism to reduce judicial engagement with technology.

B. Prosecution History Estoppel

Prosecution history estoppel further illustrates the Federal Circuit's formalistic jurisprudence. This rather technical doctrine requires a bit of explanation. A patentee's exclusive rights are normally defined by the literal language of patent claims. However, under the so-called doctrine of equivalents, the scope of a patentee's exclusive rights can extend beyond the literal claims to "equivalents" thereof.[163] While the doctrine of equivalents effectively expands the scope of patent rights, it is subject to several limiting principles.[164] One of these is prosecution history estoppel, which limits assertion of the doctrine of equivalents based on representations made by the patentee during patent prosecution (the administrative process of obtaining a patent). The most important kind of representation is a "narrowing amendment," by which the patentee decreases the scope of her asserted right based on negotiations with the PTO. The underlying theory of prosecution history estoppel is that if a patentee disclaimed particular subject matter during prosecution, she should not be able to "reclaim" that subject matter via the doctrine of equivalents.[165] She is, in other words, estopped from doing so.

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district court judges already resist being asked to determine the meaning of multiple terms in multiple claims, ... require parties to select representative patents and representative claims for decision, . . . and impose significant limits on briefing and argument over claim terms . . . .").

163. The doctrine of equivalents thus "casts around a claim a penumbra which also must be avoided if there is to be no infringement." Autogiro Co. v. United States, 384 F.2d 391, 400 (Ct. Cl. 1967).

164. For example, the doctrine of equivalents may not extend to subject matter already in the prior art. Wilson Sporting Goods Co. v. David Geoffrey & Assocs., 904 F.2d 677, 683-85 (Fed. Cir. 1990). Additionally the doctrine of equivalents may not "reclaim" subject matter disclosed in the specification but not explicitly claimed. Johnson & Johnston Assocs. v. R.E. Serv. Co., 285 F.3d 1046, 1054 (Fed. Cir. 2002) (en banc).

165. Professor Polk Wagner disputes this "ex post" conceptualization of prosecution history estoppel as intrinsically related to the doctrine of equivalents. R. Polk Wagner, *Reconsidering*

The Federal Circuit, sitting en banc, addressed the relationship between the doctrine of equivalents and prosecution history estoppel in *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.* (*Festo VI*).[166] Among its several holdings,[167] the court ruled that when prosecution history estoppel applies, it operates as a *complete* bar against any claim of equivalence for an amended element.[168] This holding resolved an intracircuit split within the Federal Circuit. Some lines of doctrine had favored a "flexible" bar, which would allow the patentee to assert *some* equivalents of a modified claim element even when prosecution history estoppel applied.[169] However, the *Festo VI* majority sided with a separate line of doctrine advocating a "complete" bar.[170] Thus, the Federal Circuit held that when prosecution history estoppel applies to an amended claim element, the patentee categorically forfeits all equivalents to that element.

As commentators and even Federal Circuit judges have recognized, *Festo VI* is highly formalistic.[171] It creates a simple bright-line rule: when estoppel applies, the patentee forfeits *all* equivalents to an element in question. The complete bar thus eliminates the need for a "speculative inquiry" into the range of equivalents that survive a narrowing amendment.[172] Tellingly, the Federal Circuit justified its complete bar on workability grounds.[173] Commenting on a stylized example, it stated that "it is impossible . . . for the public or the patentee to determine the precise range of equivalents available under the flexible bar approach."[174]

While the formalistic nature of the complete bar is well recognized, this Article highlights its specific impact on decreasing technological engagement by judges. Quite simply, the complete bar limits the range of technological inquiries that judges must perform. While infringement under the doctrine of

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Estoppel: Patent Administration and the Failure of Festo, 151 U. PA. L. REV. 159, 169 (2002). Instead, he advocates an "ex ante" conceptualization of the doctrine as promoting information disclosure. *Id.*

166. 234 F.3d 558 (Fed. Cir. 2000) (en banc), *vacated*, 535 U.S. 722 (2002) .

167. The decision actually included five en banc questions and answers. *Id.* at 566-78.

168. *Id.* at 574-75.

169. *See, e.g.*, Hughes Aircraft Co. v. United States, 717 F.2d 1351 (Fed. Cir. 1983).

170. *See, e.g.*, Kinzenbaw v. Deere & Co., 741 F.2d 383 (Fed. Cir. 1984).

171. *See Festo VI*, 234 F.3d at 620 (Linn, J., concurring in part and dissenting in part) (characterizing the majority's decision as creating a "new rigid bright line rule"); Holbrook, *Supreme Court's Complicity*, *supra* note 132, at 5; Thomas, *supra* note 15, at 783-86.

172. *Festo VI*, 234 F.3d at 577.

173. *Id.* at 575.

174. *Id.* at 577.

equivalents is a question of fact, the application of prosecution history estoppel is a question of law for courts to decide.[175] Under a flexible bar, determining the precise range of allowable equivalents when prosecution history estoppel applies is notoriously difficult. In this situation, estoppel "would apply only where the court concluded that a person skilled in the art would reasonably believe that the patentee had surrendered subject matter during prosecution."[176] Accurate application of the flexible bar thus requires a court to understand the state of knowledge of an expert artisan, industry practice, and technical differences between the original claims in an application and amended claims.

The complete bar avoids these technical inquiries. Under the complete bar, the mere fact that prosecution history estoppel applies to a particular element means that *no* equivalents are allowed. The complete bar thus lowers information costs associated with adjudicating prosecution history estoppel. To be sure, multiple mechanisms contribute to this result. The use of a rule instead of a standard in and of itself tends to simplify adjudication. However, the streamlining effects of rules have greater purchase when shielding a decisionmaker from technologically complex subject matter. In this sense, formalism helps accommodate the inherent limitations of lay assessments of technology.[177]

C. *Nonobviousness*

The Federal Circuit's traditional approach to nonobviousness has also been decidedly formalistic.[178] As noted, a new technology may not be patented if it "would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."[179] The

175. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co. (*Festo IX*), 344 F.3d 1359, 1367-68 (Fed. Cir. 2003) (en banc).

176. Thomas, *supra* note 15, at 784.

177. It does so in other ways as well. As noted, infringement under the doctrine of equivalents is a factual issue normally tried to juries. *Festo IX*, 344 F.3d at 1368. It is also highly technical. *See* Timothy R. Holbrook, *Equivalency and Patent Law's Possession Paradox*, 23 HARV. J.L. & TECH. 1, 16 (2009). The complete bar tends to constrain patentees' ability to assert infringement under the doctrine of equivalents, thus limiting juries' consideration of this difficult issue. Thus, a formalistic approach to prosecution history estoppel limits technical engagement by both judges and juries.

178. As noted, the Supreme Court has subsequently modified the Federal Circuit's approach to nonobviousness. *See infra* Section IV.E.

179. 35 U.S.C. § 103 (2006).

nonobviousness requirement thus prevents patenting inventions that are only trivial variations of the prior art.[180] While other statutory requirements, such as novelty and utility,[181] are relatively easy to satisfy, nonobviousness represents "the ultimate condition of patentability."[182] As such, it is frequently the basis for denying patent applications and invalidating issued patents in litigation.[183]

While the nonobviousness requirement is substantively important, it is also very difficult to apply.[184] A half-century ago, the Supreme Court established a broad standard for nonobviousness in *Graham v. John Deere Co.*[185] Within the *Graham* framework, the "ultimate question of patent validity"—and nonobviousness—is a question of law for courts to decide.[186] However, factual considerations inform this legal determination.[187] These factual considerations include "the scope and content of the prior art," the "differences between the prior art and the claims at issue," and "the level of ordinary skill in the pertinent art."[188] Furthermore, so-called secondary considerations, such as the commercial success of the patented invention, may be relevant to determining nonobviousness.[189] This framework takes the form of a broad standard rather than a set of precise rules, and commentators have criticized that it does not provide much guidance at all.[190] Further complicating nonobviousness inquiries, such determinations are made from the perspective of a PHOSITA,

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180. *See* ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 614-16 (4th ed. 2007) (surveying various functions of the nonobviousness requirement). In patent parlance, prior art generally refers to all publicly-available knowledge, publications, and technologies in existence at the time of invention. *See* 35 U.S.C. § 102(a), (e), (g) (2006).

181. 35 U.S.C. §§ 101-102 (2006).

182. *See* NONOBVIOUSNESS—THE ULTIMATE CONDITION OF PATENTABILITY: PAPERS COMPILED IN COMMEMORATION OF THE SILVER ANNIVERSARY OF 35 USC 103 (John F. Witherspoon ed., 1980).

183. *See* John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 208 (1998) (finding that "[b]y far the largest number of invalidity determinations were made on the basis of obviousness" as compared to other grounds).

184. *See* Harries v. Air King Prods. Co., 183 F.2d 158, 162 (2d Cir. 1950) (Hand, C.J.) (observing that the requirement of "originality," which is now understood as nonobviousness, is "as fugitive, impalpable, wayward, and vague a phantom as exists in the whole paraphernalia of legal concepts").

185. 383 U.S. 1 (1966).

186. *Id.* at 17.

187. *Id.*

188. *Id.*

189. *Id.* at 17-18.

190. *See, e.g.*, MERGES & DUFFY, *supra* note 180, at 663.

not a reasonable person or ordinary judge. Another difficulty of determining nonobviousness has to do with *timing*, and it is here that the Federal Circuit developed quite a formalistic approach.

One of the principal challenges of assessing nonobviousness is hindsight bias.[191] Nonobviousness is evaluated at the time of *invention*, which can be long before a court considers the validity of a patent in litigation.[192] Such determinations are therefore subject to hindsight bias, the tendency for technological innovations to appear obvious in hindsight.[193] For example, attaching wheels to carry-on luggage may seem obvious now, but for decades the baggage industry lacked such an advance. Hindsight bias is particularly relevant to "combination inventions" that combine existing elements – such as wheels and luggage – in a novel manner.

To guard against hindsight bias, the Federal Circuit developed the so-called teaching, suggestion, and motivation (TSM) test. Although the exact contours of the TSM test are subject to debate,[194] in essence it holds that an invention will only be considered obvious if there was some recognizable teaching, suggestion, or motivation to combine the various elements that comprise it. In the absence of such a teaching, suggestion, or motivation, the invention is considered nonobvious and thus eligible for patenting.[195] Empirical analysis

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191. Mandel, *supra* note 70.

192. *See* Allison & Lemley, *supra* note 183, at 237 (noting that, on average, it takes more than twelve years from the filing of a patent application until final judgment of an enforcement action, and even longer from the date of invention).

193. *See In re* Dembiczak, 175 F.3d 994, 998-99 (Fed. Cir. 1999).

194. Some commentators characterize the TSM test as requiring an *explicit* teaching, suggestion, or motivation to combine in the prior art. *See, e.g.*, FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY, ch. 4, at 11 (2003); Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 171 (2006); *see also* DyStar Textilfarben GmbH & Co. v. C.H. Patrick Co., 464 F.3d 1356, 1365-66 (Fed. Cir. 2006) (discussing this view). However, Federal Circuit cases before and during the pendency of *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), hold that teachings, suggestions, or motivations may be *implicit* and may arise from sources such as industry knowledge or the nature of the technical problem itself. *See, e.g.*, *DyStar*, 464 F.3d at 1361, 1365-66; Alza Corp. v. Mylan Labs., Inc., 464 F.3d 1286, 1290, 1294 (Fed. Cir. 2006). Commentators have also emphasized that the TSM test encompasses implicit teachings, suggestions, and motivations to combine. Lee Petherbridge & R. Polk Wagner, *The Federal Circuit and Patentability: An Empirical Assessment of the Law of Obviousness*, 85 TEX. L. REV. 2051, 2098 (2007); R. Polk Wagner & Katherine J. Strandburg, Debate, *The Obviousness Requirement in Patent Law*, 155 U. PA. L. REV. PENNUMBRA 96, 98 (2006), http://www.pennumbra.com/debates/pdfs/Wagner_Strandburg_Debate.pdf (opening statement of Professor Wagner).

195. *Dembiczak*, 175 F.3d at 1001 (reversing a finding of obviousness regarding a garbage bag painted to look like a jack-o'-lantern).

shows that the Federal Circuit historically utilized the TSM test in forty-five percent of nonobviousness analyses.[196]

The Federal Circuit's TSM test is highly formalistic.[197] While the Supreme Court's *Graham* framework establishes a broad standard, the TSM test attempts to impose bright-line rules on the nonobviousness inquiry.[198] In recent years, the formalistic TSM test has attracted significant criticism for producing inaccurate outcomes. In the *absence* of an identifiable teaching, suggestion, or motivation to combine references, seemingly obvious inventions will satisfy the TSM test. Thus, scholars have warned that the TSM test allowed too many inventions to pass the threshold of nonobviousness.[199]

A less appreciated facet of the TSM test is that it limits the range of technologically challenging inquiries that a court must make. Quite simply, the TSM test truncates the nonobviousness inquiry.[200] Is a phenol formaldehyde resin used to form metal castings in the foundry industry obvious or nonobvious?[201] Under the *Graham* framework, such an inquiry requires understanding the state of chemical knowledge in the foundry industry at the time of invention as well as the quantum of innovation separating the claims at issue from the prior art. The TSM test, however, provides a shortcut by focusing attention on teachings, suggestions, or motivations to combine; the absence of a TSM weighs heavily toward a determination of nonobviousness. In this sense, the TSM test functions as a heuristic that can help streamline patent adjudication.[202]

Of course, it may seem curious to characterize the TSM test—which specifically directs courts to consider contextual factors—as a "truncating" or

196. Petherbridge & Wagner, *supra* note 194, at 2055. *But see* Holbrook, *supra* note 194, at 170 (stating that the Federal Circuit has made the TSM test "effectively determinative of the obviousness question").

197. Holbrook, *Substantive Versus Process-Based Formalism*, *supra* note 132, at 128 n.22; Thomas, *supra* note 15, at 789-92.

198. *See, e.g.*, *In re* Lee, 277 F.3d 1338, 1345 (Fed. Cir. 2002) (rejecting use of "common knowledge and common sense" to find a motivation to combine).

199. *See, e.g.*, Wagner & Strandburg, *supra* note 194, at 101 (rebuttal by Professor Strandburg). *But see* Petherbridge & Wagner, *supra* note 194, at 2091-92 (finding no apparent effect of the TSM test on the likelihood of the Federal Circuit to affirm and little to no apparent effect on the likelihood of the court to reach a particular obviousness disposition).

200. *See* Dreyfuss, *Institutional Identity*, *supra* note 15, at 797.

201. *See* Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281 (Fed. Cir. 1985).

202. On a related note, the Federal Circuit has also diminished the technological nature of nonobviousness inquiries by elevating the importance of non-technological "secondary considerations," such as the commercial success of an invention, within these determinations. Eisenberg, *supra* note 44, at 893.

"limiting" inquiry. After all, the TSM test increases cognitive burdens to the extent that it compels judges to explain their rulings by identifying teachings, suggestions, and motivations to combine.[203] Even so, in a broader sense, the TSM test still enables courts to short-circuit nonobviousness analyses. It invites courts to consider a finite set of factors – namely teachings, suggestions, or motivations to combine – and to look no further. Once the court determines that a party challenging a patent has not shown one of these factors, the court may end its inquiry. By eschewing additional context, the test allows district judges to operate as cognitive misers.

D. Remedies

Federal Circuit formalism also extends to the law of patent infringement remedies. Typically, a patentee who prevails in an infringement suit seeks a permanent injunction against the defendant. Determination of injunctive relief sounds in equity[204] and ordinarily requires a court to consider a host of contextual factors.[205] However, the Federal Circuit developed a highly formalistic line of doctrine in this area, essentially establishing a simple syllogism: if infringement, then injunction. This bright-line rule culminated in *MercExchange, L.L.C. v. eBay, Inc.*, which articulated a "general rule . . . that a permanent injunction will issue once infringement and validity have been adjudged."[206]

Historically, patent courts took a less categorical approach to injunctive relief.[207] For example, courts have denied injunctions in cases when ongoing infringement of a patent would best serve public health.[208] Additionally, courts

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203. In this sense, the TSM test may play a valuable evidentiary function. By analogy, strict application of the test compels PTO examiners to identify teachings, suggestions, and motivations to combine rather than simply relying on expansive notions of "official notice" when denying patents as obvious. *See, e.g.*, *In re* Beasley, 117 F. App'x 739, 744 (2004) ("The examiner may take official notice of facts outside of the record which are capable of *instant and unquestionable demonstration* as being 'well-known' in the art.") (citing *In re* Ahlert, 424 F.2d 1088, 1091 (C.C.P.A. 1970)).

204. 35 U.S.C. § 283 (2006). *See generally* Hecht Co. v. Bowles, 321 U.S. 321, 329-30 (1944) (describing guiding principles of equity practice).

205. *See* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).

206. 401 F.3d. 1323, 1338 (Fed. Cir. 2005) (citing Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1246-47 (Fed. Cir. 1989)), *vacated*, 547 U.S. 388 (2006).

207. Douglas Ellis et al., *The Economic Implications (and Uncertainties) of Obtaining Permanent Injunctive Relief After* eBay v. MercExchange, 17 FED. CIR. B.J. 437, 440 (2008).

208. *See, e.g.*, Vitamin Technologists, Inc. v. Wis. Alumni Research Found., 146 F.2d 941, 945 (9th Cir. 1945); City of Milwaukee v. Activated Sludge, Inc., 69 F.2d. 577, 593 (7th Cir.

have denied injunctions where the "balance of convenience" favored the defendant[209] and where the patentee did not manufacture the patented product while the defendant did.[210] Notably, these decisions arose from regional circuit courts, which had jurisdiction over patent appeals prior to the establishment of the Federal Circuit in 1982. The Federal Circuit has taken a more bright-line approach to infringement remedies.[211] While the Federal Circuit has recognized instances where denying an injunction is appropriate,[212] its "general rule" until recently has been that an injunction will follow a determination of infringement.[213]

While the Federal Circuit's formalistic approach is subject to various substantive criticisms,[214] its impact on technological engagement by district judges has been less appreciated. As we will see, the equitable determination of injunctive relief can implicate a wide range of contextual factors.[215] For example, such an inquiry can consider the role of a patented component in a broader technology or the manufacturing practices of the patentee.[216] Furthermore, injunctive relief can hinge on judicial assessments of the "importance" of a patented invention to society at large. However, the Federal Circuit's bright-line rule forecloses many of these difficult inquiries, some of which are highly technological. It thus offers a shortcut that dramatically reduces the information costs of determining infringement remedies.

1934); *cf.* Hybritech Inc. v. Abbott Labs., 4 U.S.P.Q.2d (BNA) 1001, 1015 (C.D. Cal. 1987) ("Whatever else the court does, it will not cut off the supply of [patented] monoclonal test kits for cancer patients who are now using the [infringing] Abbott product."), *aff'd*, 849 F.2d 1446 (Fed. Cir. 1988).

209. Nerney v. New York, N.H. & H.R. Co., 83 F.2d 409, 410 (2d Cir. 1936).

210. Foster v. Am. Mach. & Foundry Co., 492 F.2d 1317, 1324 (2d Cir. 1974). *But see* Cont'l Paper Bag Co. v. E. Paper Bag Co., 210 U.S. 405, 430 (1908) (affirming an injunction even though the patentee did not practice the patented invention).

211. *See, e.g.*, *Richardson*, 868 F.2d at 1247 ("It is the general rule that an injunction will issue when infringement has been adjudged, absent a sound reason for denying it.") (citing W.L. Gore & Assocs., Inc. v. Garlock, Inc., 842 F.2d 1275, 1281 (Fed. Cir. 1988)).

212. *See, e.g.*, Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538, 1547 (Fed. Cir. 1995) ("If a patentee's failure to practice a patented invention frustrates an important public need for the invention, a court need not enjoin infringement of the patent."); Roche Prods., Inc. v. Bolar Pharm. Co., 733 F.2d 858, 865-66 (Fed. Cir. 1984) (remanding to consider the public health impact of enjoining infringement of a patented pharmaceutical).

213. MercExchange, L.L.C. v. eBay, Inc., 401 F.3d 1323, 1338 (Fed. Cir. 2005), *vacated*, 547 U.S. 388 (2006).

214. *See* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 396-97 (2006) (Kennedy, J., concurring) (noting the undue leverage that injunctive relief provides to some patentees).

215. *See id.* (majority opinion).

216. *Id.* at 396-97 (Kennedy, J., concurring).

E. Summary

This Part has shed new light on the widely recognized formalistic nature of Federal Circuit jurisprudence. It is well established that the Federal Circuit favors bright-line rules over broad standards; this tendency manifests itself in doctrinal areas as diverse as claim construction, prosecution history estoppel, nonobviousness, and remedies.[217] Less appreciated is the impact of formalism on the cognitive burdens of district judges. This Part has argued that Federal Circuit formalism is inherently "inquiry-truncating" and that it limits the degree to which judges must understand technologies and their context.

Whether intentionally or not, the Federal Circuit's formalistic jurisprudence reflects a cognitive miser model of technological engagement. As we have seen, laypersons often adopt heuristics to reduce the information costs of grappling with technology.[218] Formalism provides an analogous cognitive shortcut. Judges construing claims need not dwell on parsing complex technological context or the perspective of a PHOSITA within a hypertextualist approach to claim construction. Under historic Federal Circuit law, judges applying prosecution history estoppel need not explore the nuances of technological equivalents that survive a narrowing amendment; under the complete bar, none does. While the TSM test forces judges to articulate the bases for their obviousness rulings, it also truncates those inquiries: courts applying the test can streamline their consideration of the state of technical knowledge in particular fields. Finally, judges need not consider the nature of a technology or its social impact when applying a bright-line rule heavily favoring injunctions following patent infringement. In all of these cases, the Federal Circuit's formalistic jurisprudence has historically limited the degree to which judges must engage and understand complex technologies.

This Part has argued that formalism has the underappreciated effect of minimizing lay technological engagement. In particular, the inquiry-truncating nature of Federal Circuit formalism creates hard-edged rules that reduce the weight and scope of technological inquiries. The next Part considers whether these principles also apply to recent forays into patent law by the Supreme Court.

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217. Other examples abound. For instance, the Federal Circuit has adopted a bright-line, formalistic approach to the public dedication doctrine, whereby subject matter disclosed in the specification but not claimed is forfeited. *See* Johnson & Johnston Assocs. v. R.E. Serv. Co., 285 F.3d 1046, 1054 (Fed. Cir. 2002); Holbrook, *supra* note 194, at 165.

218. *See supra* Part II.

IV. THE SUPREME COURT'S HOLISTIC TURN

This Article has argued that the patent system imposes significant cognitive burdens on lay actors grappling with unfamiliar technologies. Additionally, it has argued that the patent system utilizes formalism to mitigate these burdens. In this Part, I explore a countervailing trend embodied in recent Supreme Court patent decisions. While the Court's reformulation of substantive patent law has provoked significant commentary, its methodological dimensions have received less attention. This Part highlights an emerging "holistic turn" at the Supreme Court, a turn that pushes back against Federal Circuit formalism. It further argues that the Court's preference for holistic, "information consuming" standards will increase technological engagement and attendant cognitive burdens for district judges.

A. The Supreme Court's Return to Patent Law

Actors in the patent system reduce information costs in a number of surprising ways. Historically, the Supreme Court has done so by largely deferring to the Federal Circuit on patent matters. For a long period after the Federal Circuit's establishment in 1982, the Supreme Court rarely reviewed that court's patent opinions.[219] In the first ten years of the Federal Circuit's existence, the Supreme Court only reviewed three patent decisions.[220] In a sense, this paucity of Supreme Court review reflected deference to the Federal Circuit's expert authority.[221] As a result, the Federal Circuit became "the de facto supreme court of patents."[222]

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219. *See* Timothy R. Holbrook, *The Return of the Supreme Court to Patent Law*, 1 AKRON INTELL. PROP. J. 1 (2007); Janis, *supra* note 15. The legislative history of the Federal Courts Improvement Act suggests that the Supreme Court's dormancy in patent law predated the Federal Circuit, which was created in part to "fill the void." Janis, *supra* note 15, at 395 (paraphrasing H.R. REP. NO. 97-312, at 22 (1981)); *see* Duffy, *supra* note 15, at 276; Wagner & Petherbridge, *supra* note 15, at 1115-16.

220. Duffy, *supra* note 15, at 278.

221. *See id.* at 285 ("Because patent law is a fairly technical system of property rights, the Court has always . . . looked to specialized actors in the patent system to take the lead in developing the law."). In some cases, this deference is quite explicit. In *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, the Court clarified the doctrine of equivalents, then stated, "With these limiting principles as a backdrop, we see no purpose in going further and micromanaging the Federal Circuit's particular word choice for analyzing equivalence. . . . [W]e leave such refinement to that court's sound judgment in this area of its special expertise." 520 U.S. 17, 40 (1997).

222. Janis, *supra* note 15, at 387.

Beginning in the mid-1990s, however, this deferential stance began to change as the Supreme Court increasingly asserted its appellate jurisdiction over the Federal Circuit.[223] In early cases from this period, the Court primarily considered procedural, jurisdictional, and structural issues rather than substantive patent law.[224] However, more recently, the Court has intensified its review of substantive patent doctrine.[225] In the past four years alone, the Court has issued major decisions on remedies,[226] licensee standing to sue patentees,[227] nonobviousness,[228] the extraterritorial reach of domestic patent law,[229] patent exhaustion,[230] and patentable subject matter.[231] The Supreme Court's deference to Federal Circuit jurisprudence, as well as its general indifference to patent matters, appears to have ended.[232]

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223. *See* Gregory A. Castanias et al., *Survey of the Federal Circuit's Patent Law Decisions in 2006: A New Chapter in the Ongoing Dialogue with the Supreme Court*, 56 AM. U. L. REV. 793, 798-814 (2007) (providing a similar timeline).

224. *See, e.g.*, Holmes Grp., Inc v. Vornado Air Circulation Sys., Inc., 535 U.S. 826 (2002) (addressing Federal Circuit jurisdiction); Nelson v. Adams USA, Inc., 529 U.S. 460 (2000) (concerning procedure); Fla. Prepaid Postsecondary Educ. Expense Bd. v. Coll. Sav. Bank, 527 U.S. 627 (1999) (concerning state immunity from patent infringement liability); Dickinson v. Zurko, 527 U.S. 150 (1999) (addressing the Federal Circuit's standard of review of PTO fact finding); *Markman II*, 517 U.S. 370 (1996) (addressing the relative roles of judge and jury in claim construction); Holbrook, *supra* note 219, at 1.

225. *See, e.g.*, Merck KGaA v. Integra Lifesciences I, Ltd., 545 U.S. 193 (2005) (reviewing the scope of the 35 U.S.C. § 271(e)(1) exemption from patent infringement); Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co. (*Festo VIII*), 535 U.S. 722 (2002) (delineating the contours of prosecution history estoppel); J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124 (2001) (defining the relationship between utility and plant patents); Pfaff v. Wells Elecs., 525 U.S. 55 (1998) (addressing the "on-sale" bar to obtaining a patent); Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17 (1997) (clarifying the doctrine of equivalents).

226. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).

227. MedImmune, Inc. v. Genentech, Inc., 549 U.S. 118 (2007).

228. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

229. Microsoft Corp. v. AT&T Corp., 550 U.S. 437 (2007).

230. Quanta Computer, Inc. v. LG Elecs., Inc., 128 S. Ct. 2109 (2008).

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

232. Golden, *supra* note 15, at 658; Mossoff, *supra* note 132, at 322 ("Not since 1853, when the Court decided eight patent cases, has the Court engaged so intensely with the working details of the American patent system.") (footnote omitted).

B. The Standard Interpretation: Constraining Patent Rights

The Court's recent and significant reentry into patent law has attracted considerable academic attention. For most observers, the Court's aggressiveness reflects an attempt to rein in patent rights that had become too expansive under Federal Circuit jurisprudence.[233] Around the turn of the millennium, widespread perceptions arose that patents may be impeding rather than promoting innovation. For example, the Federal Trade Commission and the National Research Council issued influential reports critiquing the proliferation of "undeserving" patents.[234] For over a decade, scholars have warned that patents on the "inputs" to research and development as well as overlapping exclusive rights may create innovation-dampening "anticommons" and "patent thickets."[235] Computer and software firms have particularly criticized the difficulties of navigating patent-laden landscapes.[236] So-called patent trolls—firms that assert patents but do not produce any products themselves—have also engendered significant criticism.[237] For the past several years, Congress has considered sweeping patent reform that would, among other proposals, expedite challenges to issued patents and curtail infringement damages.[238] For some, these reforms reflect a response to the Federal Circuit's

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233. *See, e.g.*, Steve Seidenberg, *Reinventing Patent Law*, A.B.A. J., Feb. 2008, at 60. Interestingly, in repeatedly reversing the Federal Circuit, the Supreme Court has expressed fealty to historical patent doctrines. Mossoff, *supra* note 132, at 324.

234. FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY (2003), *available at* http://www.ftc.gov/os/2003/10/innovationrpt.pdf; NAT'L RESEARCH COUNCIL, A PATENT SYSTEM FOR THE 21ST CENTURY (Stephen A. Merrill et al. eds., 2004); NAT'L RESEARCH COUNCIL, REAPING THE BENEFITS OF GENOMIC AND PROTEOMIC RESEARCH: INTELLECTUAL PROPERTY RIGHTS, INNOVATION, AND PUBLIC HEALTH (Stephen A. Merrill & Anne-Marie Mazza eds., 2006).

235. *See, e.g.*, Lori Andrews et al., *When Patents Threaten Science*, 314 SCIENCE 1395 (2006); Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698 (1998); Peter Yun-hyoung Lee, *Inverting the Logic of Scientific Discovery: Applying Common Law Patentable Subject Matter Doctrine to Constrain Patents on Biotechnology Research Tools*, 19 HARV. J.L. & TECH. 79, 81 (2005); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, *in* 1 INNOVATION POLICY AND THE ECONOMY 119 (Adam B. Jaffe et al. eds., 2001).

236. *See* COALITION FOR PAT. FAIRNESS, http://www.patentfairness.org/ (last visited Sept. 6, 2010).

237. Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. REV. 1571, 1577-82 (2009) (noting widespread distaste for "patent trolls"). *But see* MERGES & DUFFY, *supra* note 180, at 939-40 (identifying salutary functions played by nonpracticing entities).

238. *See, e.g.*, Patent Reform Act of 2010, S.515, 111th Cong. (2010) (amending in the nature of a substitute the Patent Reform Act of 2009, S. 515, 111th Cong. (2009)); Patent Reform Act of

alleged "pro-patentee" jurisprudence that made it relatively easy to obtain and enforce strong patent rights.[239]

Against this background, the standard interpretation holds that the Supreme Court's recent decisions aim to rein in expansive patent rights. Certainly, the Court's patent jurisprudence over the past decade and a half fits comfortably within this thesis; the Court has made patents harder to obtain, easier to defeat, and narrower in scope. The Court has expanded "safe harbors" from patent infringement,[240] weakened the presumption of injunctive relief following infringement,[241] and enhanced the ability of licensees to challenge the validity of patents.[242] It has also shored up the nonobviousness requirement,[243] narrowed the circumstances in which overseas activities constitute infringement,[244] and expanded the doctrine of patent "exhaustion."[245] Commenting on a case that ultimately was not reviewed because of procedural considerations, Justice Breyer tellingly noted that "sometimes *too much* patent protection can impede rather than 'promote the Progress of Science and useful

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2009, S. 610, 111th Cong. (2009); Patent Reform Act of 2009, H.R. 1260, 111th Cong. (2009); Patent Reform Act of 2008, S. 3600, 110th Cong. (2008); Patent Reform Act of 2007, S. 1145, 110th Cong. (2007); Patent Reform Act of 2007, H.R. 1908, 110th Cong. (2007); Patent Reform Act of 2006, S. 3818, 109th Cong. (2006); Patent Reform Act of 2005, H.R. 2795, 109th Cong. (2005).

239. *See* William M. Landes & Richard A. Posner, *An Empirical Analysis of the Patent Court*, 71 U. CHI. L. REV. 111, 112, 128 (2004). *Compare* Allison & Lemley, *supra* note 183, at 205-06 (reporting that from 1989-1996, courts held patents invalid in approximately fifty percent of cases where validity was at issue and decided), *with American Patent System: Hearing on S. Res. 92 Before the Subcomm. on Patents, Trademarks, & Copyrights of the S. Comm. on the Judiciary*, 84th Cong. 176-85 (1955) (report of P.J. Federico), *reprinted in Adjudicated Patents, 1948-54*, 38 J. PAT. OFF. SOC'Y 233, 236 (1956) (finding that from 1948 to 1954, well before the creation of the Federal Circuit, courts held patents invalid in sixty to seventy percent of cases where validity was at issue). However, it is not clear that the Federal Circuit favors patentees in the context of infringement. Matthew D. Henry & John L. Turner, *The Court of Appeals for the Federal Circuit's Impact on Patent Litigation*, 35 J. LEGAL STUD. 85, 90 (2006) (finding the Federal Circuit significantly more reluctant than its predecessors to affirm decisions of invalidity but consistent with predecessors in affirming decisions of noninfringement); Janis, *supra* note 15, at 400-01.

240. Merck KGaA v. Integra Lifesciences I, Ltd., 545 U.S. 193 (2005) (extending the 35 U.S.C. § 271(e) exemption to preclinical activities "reasonably related" to an informational submission to a regulatory agency); Eli Lilly & Co. v. Medtronic, Inc., 496 U.S. 661 (1990) (extending the § 271(e) exemption to patented medical devices).

241. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).

242. MedImmune, Inc. v. Genentech, Inc., 549 U.S. 118 (2007).

243. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

244. Microsoft Corp. v. AT&T Corp., 550 U.S. 437 (2007).

245. Quanta Computer, Inc. v. LG Elecs., Inc., 128 S. Ct. 2109 (2008).

Arts.'"[246] In sum, the Court's recent interventions have clearly operated to narrow substantive patent rights.[247]

C. *A New Interpretation: Holism and Contextual Engagement*

While this *substantive* narrowing of patent rights is indeed significant, I wish to highlight an underappreciated but important *methodological* shift in these rulings.[248] In parallel to constraining patent rights, the Supreme Court is systematically favoring holistic standards over formalistic, bright-line rules. Whereas the Federal Circuit's rule-based doctrine is overwhelmingly "inquiry-truncating," the Supreme Court's new standards compel decisionmakers to engage in multifactored examinations of inventions and their technological context. In contradistinction to Federal Circuit formalism, I characterize this as the Supreme Court's "holistic turn."

Although I distinguish between these substantive and methodological trends for analytical purposes, they may be highly related. As with my discussion of Federal Circuit formalism, I do not contend that the Supreme Court has embraced a particular doctrinal methodology as an end in itself. Rather, its methodological preference arises as a byproduct of pursuing broader, more substantive goals. In the case of the Supreme Court, these goals include reformulating Federal Circuit doctrine that (according to some) has produced low-quality patents and inaccurate outcomes.[249] Seen in this light, the Court's recent patent decisions reflect a sentiment that enhancing accuracy may go hand-in-hand with requiring courts to engage more fully with technological context.

This "holistic turn" has significant implications for the administration of patent law. Of course, any move from rules to standards will likely increase the difficulty of adjudication.[250] In this sense, the Court's holistic turn implicates a well-established trade-off between promoting accuracy, which often requires detailed factual analyses, and facilitating ease of administration.[251] However,

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246. Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124, 126 (2006) (Breyer, J., dissenting from dismissal of the writ of certiorari) (quoting U.S. CONST. art. I, § 8, cl. 8).

247. *But see* Bilski v. Kappos, 130 S. Ct. 3218 (2010) (articulating a conception of patentable subject matter that is arguably broader than previous Federal Circuit doctrine).

248. While a few commentators have recognized this development, none has explored the connection between patent standards and greater technological engagement by judges. *See, e.g.*, Mossoff, *supra* note 132, at 372; Rai, *supra* note 47, at 2052 n.4.

249. *See* Dreyfuss, *Institutional Identity*, *supra* note 15, at 796.

250. *See* Kaplow, *supra* note 143, at 562-63.

251. *See* Dreyfuss, *Institutional Identity*, *supra* note 15, at 796.

difficulties of application are likely to be exacerbated in patent law, where holistic standards increase the degree to which district judges must engage with technological context. In the following sections, I explore the emergence of this "holistic turn" and its implications for the intersection of legal and technological cultures. I do so by returning to three doctrinal areas discussed above: prosecution history estoppel, nonobviousness, and patent infringement remedies.[252]

D. Festo*: A Flexible Approach to Prosecution History Estoppel*

The leading edge of the Supreme Court's recent "holistic turn" is its 2002 decision in *Festo Corp. v. Shoketsu Kinzoku Kogyokabushiki Co.* (*Festo VIII*).[253] As described earlier, the Federal Circuit, based partly on "workability" concerns, adopted a formalistic approach to prosecution history estoppel in *Festo VI*. Under the Federal Circuit's "complete bar," when prosecution history estoppel applied to a claim element, it foreclosed the patentee from asserting any equivalents to that element.[254] This approach is intrinsically inquiry-truncating; courts need not inquire into the specific reasons behind a narrowing amendment to determine if any equivalents survive estoppel.

On appeal, the Supreme Court rejected the complete bar and instead held that prosecution history estoppel operates as a *flexible* bar.[255] Within this framework, even when prosecution history estoppel applies to a claim element, a patentee may still be able to assert some equivalents to that element. According to the flexible bar, determining the reach of estoppel "requires an examination of the subject matter surrendered by the narrowing amendment."[256] In announcing its flexible bar, the Court did not focus on "workability" concerns. Rather, the Court invoked the overarching *purpose* of prosecution history estoppel: to hold the inventor to representations made

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252. *See supra* Sections III.B-D.

253. 535 U.S. 722 (2002). This case attracted significant attention and "whipped the patent bar into an unprecedented frenzy." John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955, 956-57 (2007); *see* Castanias et al., *supra* note 223, at 808 (suggesting that *Festo VIII* ushered in a new wave of Supreme Court review of Federal Circuit case law).

254. *See supra* Section III.B.

255. This comprised the second of two holdings. The Supreme Court also affirmed the Federal Circuit's ruling that *any* narrowing amendment made to comply with the Patent Act—not only those made to avoid the prior art—could trigger prosecution history estoppel. *Festo VIII*, 535 U.S. at 737.

256. *Id.*

during prosecution and reasonable inferences arising from them.[257] In so doing, it implicitly suggested that the Federal Circuit's complete bar, though economical, facilitated inaccurate outcomes.

Rather than endorse the complete bar, the Court established a presumption whereby patentees bear a burden of showing that a particular narrowing amendment did *not* surrender a particular equivalent in question.[258] The Court offered three examples where a narrowing amendment would not necessarily surrender a particular equivalent:

> The equivalent may have been unforeseeable at the time of the application; the rationale underlying the amendment may bear no more than a tangential relation to the equivalent in question; or there may be some other reason suggesting that the patentee could not reasonably be expected to have described the insubstantial substitute in question.[259]

The Supreme Court's approach to prosecution history estoppel is decidedly holistic.[260] It rejects the Federal Circuit's bright-line, inquiry-truncating rule in favor of a flexible standard.[261] The Court's test is attentive to *context*: it demands that courts scrutinize the particular equivalent asserted and ask *why* a patentee made a narrowing amendment. For example, the foreseeability inquiry[262] requires a deep examination of a technical field. A judge must determine what would have been unforeseeable to a PHOSITA at the time that a patentee made a narrowing amendment. Such an inquiry requires an expansive understanding of the element in question, the state of the art at a

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257. *Id.* at 737-38.

258. *Id.* at 740.

259. *Id.* at 740-41.

260. *See* Glaxo Wellcome, Inc. v. Impax Labs., Inc., 220 F. Supp. 2d 1089, 1093 (N.D. Cal. 2002) ("The *Festo* court rejected a bright-line rule, . . . favoring a flexible approach."). *Festo VIII* extended the Court's holistic stance toward the doctrine of equivalents and prosecution history estoppel articulated in earlier cases. *See* Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 30-34 (1997) (rejecting the bright-line rule that *any* surrender of subject matter during patent prosecution precluded assertion of the doctrine of equivalents); Graver Tank & Mfg. Co. v. Linde Air Prods., 339 U.S. 605, 609 (1950) ("Equivalence, in the patent law, is not the prisoner of a formula and is not an absolute to be considered in a vacuum.").

261. *See* Wagner, *supra* note 165, at 169 ("[T]he choice between strong and flexible versions of estoppel is a debate about rules versus standards.").

262. This test has garnered support from various judges and commentators. *See, e.g.*, *Festo IX*, 344 F.3d 1359, 1374 (Fed. Cir. 2003) (en banc) (Rader, J., concurring); Matthew J. Conigliaro, Andrew C. Greenberg & Mark A. Lemley, *Foreseeability in Patent Law*, 16 BERKELEY TECH. L.J. 1045 (2001).

particular time, and how that art could be reasonably expected to evolve. This multifaceted inquiry is a far cry from the Federal Circuit's economical complete bar.

To be sure, one must assess the Supreme Court's decision in *Festo* with a proper sense of proportion. As Professor Thomas notes, the Court largely vindicated the Federal Circuit's restrictive approach to the doctrine of equivalents; the three avenues by which patentees may rebut the presumption of estoppel are "slender" indeed.[263] Moreover, upon remand and in subsequent cases, the Federal Circuit has narrowly construed the "tangentialness"[264] and "some other reason"[265] prongs. In a broader sense, Professors John Allison and Mark Lemley argue that changes in rules governing the doctrine of equivalents have had little impact on actual cases and even less effect on cases involving prosecution history estoppel.[266] However, in modifying prosecution history estoppel doctrine, the Court nevertheless exhibited a significant methodological shift.

Notably, the Court's holistic approach to prosecution history estoppel invites greater technological engagement by district judges. As revealed in the *Festo* remand, rebutting the presumption of prosecution history estoppel requires a deep examination of technological facts.[267] As a preliminary matter, the Federal Circuit held that this determination is a question of law to be determined by a court, not a jury, thus placing this burden squarely on district judges.[268] The Federal Circuit then proceeded to flesh out the three instances identified by the Supreme Court where a patentee could rebut the presumption of estoppel. Regarding the first option, the Federal Circuit noted, "By its very nature, objective unforeseeability depends on underlying factual issues relating to, for example, the state of the art and the understanding of a hypothetical person of ordinary skill in the art at the time of the amendment."[269] Accordingly, courts may consider expert testimony and other extrinsic evidence

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263. Thomas, *supra* note 15, at 786.

264. *See* Amgen Inc. v. Hoechst Marion Roussel, Inc., 457 F.3d 1293, 1313-15 (Fed. Cir. 2006).

265. *Festo IX*, 344 F.3d at 1370.

266. Allison & Lemley, *supra* note 253, at 957.

267. *Festo IX*, 344 F.3d at 1367.

268. *Id.* at 1367.

269. *Id.* at 1369; *see also id.* at 1377 (Rader, J., concurring) ("In applying the foreseeability exception, the trial court must assess the factual record of events during prosecution, the factual contents of custom and usage of terms in the relevant art, the factual level of ordinary skill in the art, the factual bounds of the prior art, and the factual understanding of a person of ordinary skill in the art at the time of invention.").

in performing these inquiries.[270] Second, the Federal Circuit also held that courts may, in certain circumstances, consider expert testimony when examining the prosecution history to determine if a particular narrowing amendment is "tangential" to a particular equivalent in question.[271] Finally, the Federal Circuit preserved the possibility that courts could consider extrinsic evidence to determine whether there was "some other reason" for why a patentee could not have been expected to have described a particular equivalent when making a narrowing amendment.[272]

As cases and commentators have demonstrated, the foreseeability inquiry is highly factually intensive.[273] For example, in *Robert Bosch GmbH and S-B Power Tool Co. v. Japan Storage Battery Co.*, the patent holder asserted infringement of its patented power drills under the doctrine of equivalents; the accused infringer countered by asserting prosecution history estoppel.[274] In determining the scope of estoppel, the district court had to examine the state of the art of power drilling as well as technical differences between the patented and accused drills. Ultimately, it concluded that it "was foreseeable to one of skill in the art of two speed planetary transmissions that levers of a different geometric shape—like the segmented, octagonal levers used in the Bosch PG1 gearset—could be used instead of the smoothly curved lever described in" the patent.[275] Such engagement with technological facts is characteristic of the "foreseeability" prong of prosecution history estoppel.

Inquiries into the "tangentialness" exception can be similarly technologically demanding. Within this framework, patentees are more likely to rebut the presumption of estoppel when making amendments not aimed at avoiding prior art[276] or amendments to avoid nonanalogous prior art.[277]

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270. *Id.* at 1369 (majority opinion).

271. *Id.* at 1370.

272. *Id.* (quoting *Festo VIII*, 535 U.S. 722, 741 (2002)).

273. J. Andrew Lowes & David L. McCombs, *Off on a Tangent: Using* Festo*'s Second Criterion To Rebut the Presumption of Surrender*, 88 J. PAT. & TRADEMARK OFF. SOC'Y 579, 584 (2006).

274. 223 F. Supp. 2d 1159 (C.D. Cal. 2002).

275. *Id.* at 1171.

276. *See, e.g.*, Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc., No. SA CV 03-110-GLT (ANx), 2005 U.S. Dist. LEXIS 6567, at *16-18 (C.D. Cal. Apr. 8, 2005) (finding an amendment made to overcome a § 112 rejection to be tangential), *aff'd in part, rev'd in part, vacated in part, and remanded*, 424 F.3d 1293 (Fed. Cir. 2005); Amgen Inc. v. Hoechst Marion Roussel, Inc., 287 F. Supp. 2d 126 (D. Mass. 2003) (finding an amendment made to overcome a § 103 double patenting rejection to be tangential).

277. *See, e.g.*, Insituform Techs., Inc. v. Cat Contracting, Inc., 385 F.3d 1360 (Fed. Cir. 2004); Cordis Corp. v. Medtronic Ave, Inc., 336 F. Supp. 2d 363 (D. Del. 2004); Shane Grp., Inc. v.

Conversely, courts have rejected rebuttals because of lack of information in the record[278] and because the prior art avoided by the narrowing amendment was similar to the alleged equivalent.[279] These considerations impose heavy burdens on district courts, which must determine what constitutes prior art, what constitutes nonanalogous art, and whether a particular prior art reference is similar to an equivalent in question.

While the Federal Circuit's complete bar reduces information costs, the Supreme Court's flexible bar substantially raises them. The Court's holistic standard does so in large part because it compels greater judicial engagement with technological facts.[280] As we will see, wide-ranging technological inquiries and increased information costs are characteristic of the Court's recent holistic turn.

E. KSR*: An Expansive Approach to Nonobviousness*

The Supreme Court's treatment of nonobviousness further illustrates its preference for holistic standards over formalistic rules. As discussed, one of the primary difficulties of determining nonobviousness is hindsight bias.[281] To ameliorate this bias, the Federal Circuit developed the TSM test, which requires courts to identify some teaching, suggestion, or motivation to combine the elements of an invention before characterizing it as obvious.[282] As we have seen, this formalistic test can streamline and truncate nonobviousness determinations. In addition, the Federal Circuit's test has attracted criticism as rendering patents too easy to obtain.

In *KSR v. Teleflex*, the Supreme Court repudiated the Federal Circuit's formalistic application of the TSM test.[283] In that case, the Court concluded that an adjustable gas pedal combined with an electronic throttle sensor was

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BCI Burke Co., No. 1:02-CV-58, 2002 U.S. Dist. LEXIS 25955 (W.D. Mich. Aug. 12, 2002); Vardon Golf Co. v. Karsten Mfg. Corp., No. 99 C 2785, 2002 U.S. Dist. LEXIS 11802 (N.D. Ill. June 27, 2002).

278. *See, e.g.*, Mycogen Plant Sci., Inc. v. Monsanto Co., 91 F. App'x 666 (Fed. Cir. 2004); Applera Corp. v. MJ Research Inc., 311 F. Supp. 2d 263 (D. Conn. 2004).

279. *See, e.g.*, Rhodia Chimie v. PPG Indus., 402 F.3d 1371 (Fed. Cir. 2005); Bus. Objects, S.A. v. Microstrategy, Inc., 393 F.3d 1366 (Fed. Cir. 2005).

280. The difficulties of the Supreme Court's "flexible bar" are further compounded by one of the central challenges of claim construction: such determinations are made from the perspective of a PHOSITA, not a reasonable person or ordinary judge. *See supra* note 44.

281. *See supra* notes 191-193 and accompanying text.

282. *See supra* Section III.C.

283. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

obvious.[284] In so doing, it reversed the Federal Circuit, which had relied on the TSM test to vacate the district court's ruling of obviousness.[285] Noting that the TSM test "captured a helpful insight," the Court nevertheless characterized the Federal Circuit's application of the test as a "rigid and mandatory formula[]" incompatible with prior precedents.[286] Revealing its holistic preferences, the Court stated that the "obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation."[287] In particular, the Court criticized the TSM test for artificially truncating the nonobviousness inquiry.[288]

In its place, the Court articulated a holistic approach to nonobviousness. Drawing on prior case law, notably *Graham v. John Deere Co.*, the Court advocated a "functional," "expansive and flexible approach" to nonobviousness.[289] The Court criticized the Federal Circuit's overemphasis on explicit (i.e., written) teachings, suggestions, or motivations to combine, noting that the "diversity of inventive pursuits and of modern technology counsels against limiting" the nonobviousness analysis to such factors.[290] The Court further observed that some designs may be too obvious to be described in writing[291] and that sometimes, subtle motivations such as market demand may render a new combination obvious.[292] Accordingly, the Court clarified that courts "need not seek out precise teachings" to conclude that a particular invention is obvious.[293]

Paralleling its holistic vision of nonobviousness, the Court also articulated an expansive vision of the PHOSITA. The PHOSITA embodied in the Federal Circuit's TSM test exhibits rather impoverished inventive capacity.[294] In the absence of some discernible teaching, suggestion, or motivation to combine

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284. *Id.* at 407.

285. Teleflex, Inc. v. KSR Int'l Co., 119 F. App'x 282 (Fed. Cir. 2005), *rev'd*, 550 U.S. 398.

286. *KSR*, 550 U.S. at 418, 419.

287. *Id.* at 419.

288. *Id.* ("But when a court transforms the general principle into a rigid rule that limits the obviousness inquiry, as the Court of Appeals did here, it errs.").

289. *Id.* at 415 (citing Graham v. John Deere Co., 383 U.S. 1, 12, 18 (1966); Hotchkiss v. Greenwood, 52 U.S. (11 How.) 248 (1850)).

290. *Id.* at 419.

291. *Id.*

292. *Id.*

293. *Id.* at 418.

294. *Cf.* Eisenberg, *supra* note 44, at 891 (noting "a judicial presumption . . . that PHOSITA is an uncreative plodder, incapable of making inventions of his own").

elements in the prior art, courts should presume that a PHOSITA would not do so (and thus that a particular combination is nonobvious). In *KSR*, however, the Supreme Court emphasized that "[a] person of ordinary skill is also a person of ordinary creativity, not an automaton."[295] This more expansive notion of the PHOSITA lessens reliance on precise teachings to conclude that an invention is obvious, "for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ."[296] *KSR* thus invites judges to take a broader view of the inventive endeavor and to recognize a basal level of "technical creativity" that pervades specialized arts.

While *KSR* has attracted significant attention, it is again important to take a step back to consider what exactly, if anything, it has changed. To be sure, commentators,[297] the Federal Circuit,[298] and the PTO[299] have suggested that *KSR* largely affirmed existing approaches to nonobviousness. However, as a doctrinal matter, rigid application of the TSM test is no longer proper. And in addition to its substantive impact, *KSR* is important as yet another demonstration of the Supreme Court's holistic turn.

The Supreme Court's rejection of the formalistic TSM test and embrace of a flexible standard promise to increase cognitive burdens on district judges. In short, the Court has "broadened the scope of the obviousness inquiry."[300] For district courts, this new, holistic framework is both liberating and intimidating. The Court's expansive notions of nonobviousness and the PHOSITA parallel a greater role for judicial "common sense" in determining the obviousness of

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295. *KSR*, 550 U.S. at 421.

296. *Id.* at 418.

297. Petherbridge & Wagner, *supra* note 194, at 2104-05; S. Jay Plager & Lynne E. Pettigrew, *Rethinking Patent Law's Uniformity Principle: A Response to Nard and Duffy*, 101 NW. U. L. REV. 1735, 1749 (2007).

298. While *KSR* was pending at the Supreme Court, the Federal Circuit issued two opinions arguably anticipating and responding to the Court's reconsideration of the TSM test. *See KSR*, 550 U.S. at 421 (citing DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co., 464 F.3d 1356, 1367 (Fed. Cir. 2006); Alza Corp. v. Mylan Labs., Inc., 464 F.3d 1286, 1291 (Fed. Cir. 2006)).

299. *See* Memorandum from Margaret A. Focarino, PTO Deputy Comm'r for Patent Operations, to Tech. Ctr. Dirs. (May 3, 2007), *available at* http://www.patenthawk.com/blog_docs/070503_USPTO_obviousness_memo.pdf (emphasizing that the Court did not wholly disavow the TSM test).

300. Stephen G. Kunin & Andrew K. Beverina, Commentary, KSR*'s Effect on Patent Law*, 106 MICH. L. REV. FIRST IMPRESSIONS 50, 51 (2007), http://www.michiganlawreview.org/firstimpressions/vol106/kuninbeverina.pdf.

inventions.[301] District courts are no longer shackled to a narrow version of the TSM test, and they have broader rein to find inventions obvious based on amorphous factors such as industry dynamics and market demand. However, while expanding the scope of the nonobviousness inquiry, *KSR* does not allow courts to rule based on mere instinct and intuition. The opinion clearly states that the analysis informing nonobviousness determinations "should be made explicit" and cannot rest on conclusory statements.[302] The Supreme Court's holistic shift thus puts district judges, and their cognitive faculties, squarely at the heart of the nonobviousness inquiry.

As part and parcel of this shift, the Court's holistic framework opens up a wide array of technological factors to consider in determining nonobviousness. As the Court's opinion in *KSR* notes, "Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art . . . ."[303] Far from the inquiry-truncating TSM test, where a judge could focus on a narrow range of fairly tangible information, the Supreme Court's holistic framework invites broad, substantive engagement with technological context.

In very concrete ways, *KSR* expands district courts' inquiries into the prior art. In its earlier consideration of *KSR*, the Federal Circuit had discounted the relevance of a particular prior art reference, the Asano patent, which tended to render obvious the patented invention at issue.[304] According to the Federal Circuit, because the Asano patent did not address the same technical problem that the *KSR* patentee sought to address, it was not a reference that a PHOSITA could be expected to consider.[305] Therefore, it could not provide a teaching, suggestion, or motivation to combine. However, the Supreme Court expanded the range of inquiry, stating that "*any* need or problem known in the field" can motivate a PHOSITA to create a particular invention.[306] When considering the functionality of the Asano patent, the Court concluded that it rendered the patented invention obvious.[307]

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301. *Cf. KSR*, 550 U.S. at 421 ("Rigid preventative rules that deny recourse to common sense are neither necessary under, nor consistent with, this Court's case law.").

302. *Id.* at 418; *see In re* Kahn, 441 F.3d 977, 988 (Fed. Cir. 2006).

303. 550 U.S. at 418.

304. *Id.* at 420. Notably, the Asano patent had not been considered by the PTO when it granted the patent at issue in *KSR*. *Id.* at 411-12.

305. Teleflex, Inc. v. KSR Int'l Co., 119 F. App'x 282, 288 (Fed. Cir. 2005), *rev'd*, 550 U.S. 398 (2007).

306. 550 U.S. at 420 (emphasis added).

307. *Id.* at 422.

Early case law reveals the technologically and factually expansive nature of the *KSR* framework. *Asyst Technologies, Inc. v. Empak, Inc.* offers a particularly illuminating example because the district court proceedings spanned the Supreme Court's adjudication of *KSR*.[308] In *Asyst*, Asyst Technologies accused Jenoptik of infringing its patented methods for tracking articles during the manufacture of integrated circuits.[309] At one point in the litigation, Jenoptik moved for summary judgment, asserting that Asyst's patented methods were invalid on several grounds, including obviousness.[310] Applying pre-*KSR* case law, the district court denied Jenoptik's motion for summary judgment on the invalidity of the asserted claims, and a jury subsequently found Asyst's patents valid and infringed.[311] The Supreme Court then decided *KSR*, and the district court considered Jenoptik's post-trial motion for judgment as a matter of law in light of the Court's new guidance on nonobviousness.[312]

A crucial issue was whether a particular reference, the Hesser patent, fell within the scope of relevant prior art. The jury found that it did not. However, applying *KSR*'s more expansive notion of the PHOSITA's creative faculties, the district court ruled that the Hesser patent *did* comprise relevant prior art.[313] Having included this prior art reference in its analysis, the district court went ahead to compare the Hesser patent to Asyst's claims and concluded that the Hesser reference was similar enough to render Asyst's methods obvious.[314] The *KSR* framework thus expanded the universe of prior art the district court had to consider and compelled detailed technical examinations of that prior art and the claims at issue. In so doing, *KSR* helped raise the information costs of adjudicating nonobviousness.[315]

Once again, the Supreme Court's preference for a holistic standard over formalistic rules promises to increase technological engagement by generalist judges. *KSR* expands the universe of technologically relevant inquiries that

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308. No. C 98-20451 JF (EAI), 2007 WL 2255220, at *1 (N.D. Cal. Aug. 3, 2007).

309. *Id.* at *1-2.

310. *Id.*

311. *Id.* at *2.

312. *Id.* at *4.

313. *Id.* at *5-6.

314. *Id.* at *7-9, *11.

315. The Federal Circuit's application of *KSR* has further demonstrated the technologically and factually intensive nature of nonobviousness determinations. *See, e.g.*, Commonwealth Sci. & Indus. Research Org. v. Buffalo Tech. (USA), Inc., 542 F.3d 1363, 1375 (Fed. Cir. 2008) (noting the "highly factual" argument "at the core of the obviousness issue presented in this case").

judges should make while providing them with little concrete guidance on how to do so.

F. eBay*: An Equitable Standard for Injunctive Relief*

The Supreme Court's holistic trend is also evident in its approach to patent infringement remedies. For many years, the Federal Circuit had followed a "general rule . . . that a permanent injunction will issue once infringement and validity have been adjudged."[316] As discussed, this formalistic, inquiry-truncating rule established a neat syllogism: if infringement, then injunction (absent exceptional circumstances).[317] However, in 2006, the Supreme Court rejected this formalistic approach in *eBay Inc. v. MercExchange, L.L.C.*[318]

In *eBay*, the Supreme Court replaced the Federal Circuit's formalistic rule with an equitable standard. Writing for the majority, Justice Thomas held that the decision to grant or deny injunctive relief rests within the discretion of the district court, consistent with traditional equitable principles.[319] Within this framework,

> A plaintiff must demonstrate: (1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction.[320]

eBay is a simple holding with profound implications. The decision ended the practice of virtually automatically granting an injunction upon a finding of infringement and introduced a multifactor test to determine the appropriateness of injunctive relief.[321]

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316. MercExchange., L.L.C. v. eBay, Inc., 401 F.3d. 1323, 1338 (Fed. Cir. 2005) (citing Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1246-47 (Fed. Cir. 1989)), *vacated*, 547 U.S. 388 (2006).

317. *See supra* Section III.D.

318. 547 U.S. 388 (2006).

319. *Id.* at 390.

320. *Id.* at 391.

321. Doctrinally, courts have read *eBay* as removing the presumption of irreparable harm upon a finding of patent infringement. *See, e.g.*, Automated Merch. Sys. v. Crane Co., Nos. 2009-1158, -1164, 2009 WL 4878643, at *3 (Fed. Cir. Dec. 16, 2009); IMX, Inc. v. LendingTree, LLC, 469 F. Supp. 2d 203, 224 (D. Del. 2007).

The case has sparked voluminous commentary regarding its substantive impact on patent strength. On the one hand, commentators have suggested that *eBay* may affect everything from the market power of patent trolls[322] to the public availability of intellectual infrastructure.[323] On the other hand, Chief Justice Roberts noted in his *eBay* concurrence that courts applying equitable principles have long issued injunctions in the vast majority of patent cases and that *eBay* simply marked a return to those prior principles.[324] Early empirical evidence suggests that the *eBay* standard may in fact be changing the status quo. In the first thirty cases applying *eBay*, district courts issued permanent injunctions seventy-seven percent of the time, compared to eighty-four percent for pre-*eBay* cases.[325] In addition to its substantive impact, however, the case offers another significant illustration of the Supreme Court's holistic turn.

Contrary to the Federal Circuit's per se rule, the *eBay* standard greatly increases the information costs of determining patent infringement remedies.[326] Again, any move from a bright-line rule to a flexible standard will likely increase cognitive burdens. These effects, however, are significantly amplified given the technologically complex subject matter falling within the scope of this standard.

eBay compels greater technological engagement in two ways. First, in the most immediate sense, it directs judges to evaluate the nature of a technology and its context when determining the appropriateness of injunctive relief. For example, in *eBay*'s other concurrence, Justice Kennedy instructed courts to consider "the nature of the patent being enforced and the economic function of the patent holder."[327] In particular, courts should consider whether a patented technology comprises but one component of a broader invention as well as the

322. Andrew Beckerman-Rodau, *The Aftermath of* eBay v. MercExchange, *126 S. Ct. 1837 (2006): A Review of Subsequent Judicial Decisions*, J. PAT. & TRADEMARK OFF. SOC'Y 631, 632-33 & n.12 (2007).

323. *See* Peter Lee, *The Evolution of Intellectual Infrastructure*, 83 WASH. L. REV. 39 (2008).

324. 547 U.S. at 395 (Roberts, C.J., concurring).

325. Robert M. Isackson, *After 'eBay,' Injunctions Decrease*, NAT'L L.J., Dec. 3, 2007, at S1 (citing Paul M. Janicke, HIPLA Professor of Law, Univ. of Houston Law Ctr., Recent Developments, Strategies & Tactics in IP Damages Law, Presentation to the Intellectual Prop. Owners Ass'n (Mar. 27, 2007)).

326. *See* Ernest Grumbles III, Rachel C. Hughey & Susan Perera, *The Three Year Anniversary of* eBay v. MercExchange*: A Statistical Analysis of Permanent Injunctions*, INTELL. PROP. TODAY, Nov. 2009, at 25, 26 (noting a wide variety of inquiries informing the *eBay* analysis).

327. 547 U.S. at 396 (Kennedy, J., concurring); *see also* Transocean Offshore Deepwater Drilling, Inc. v. GlobalSantaFe Corp., No. H-03-2910, 2006 WL 3813778, at *5 (S.D. Tex. Dec. 27, 2006) (citing Justice Kennedy's instruction).

business practices of the patentee seeking an injunction.[328] In a wider sense, fastidious application of the *eBay* framework invites judges to examine an invention's impact on the market, competitive landscape, and social welfare, broadly defined.[329] Under the Federal Circuit's per se rule, remedies analysis rarely involved such considerations.

Second, *eBay* shifts more emphasis to another, highly technical inquiry: determining damages.[330] Increased denials of injunctive relief will lead more patentees to seek ongoing royalties for prospective, ongoing infringement. District courts, of course, cannot avoid the difficulties of determining damages, which are the only remedy available for *past* infringement occurring before an injunction.[331] However, valuing technologies and calculating damages—particularly on a prospective basis—tend to be highly complex, multifactor analyses. In a tautological sense, the difficulties of calculating damages are reflected in the *eBay* standard itself: the fact that damages are difficult to quantify is a factor weighing in favor of simply granting an injunction.[332]

Determining ongoing royalties in light of *eBay* raises several difficult questions. For example, should courts calculate royalties as if they were to continue in perpetuity, or as if they are expected to cease at some time in the future? Ordinarily, royalty damages are based on a "hypothetical negotiation" between the patentee and the infringer.[333] While such negotiations traditionally took place against the backdrop of property rule enforcement of the patent, the value of the patent is somewhat discounted now because of the availability of liability rule protection.[334] These inquiries, while not themselves technological in nature, exacerbate the difficulty of protecting technological assets with

328. 547 U.S. at 396 (Kennedy, J., concurring).

329. *See, e.g.*, z4 Techs., Inc. v. Microsoft Corp., 434 F. Supp. 2d 437 (E.D. Tex. 2006) (evaluating the impact of re-releasing 450 versions of Microsoft Office and 600 versions of Microsoft Windows, all of which infringed z4's patents).

330. *See* FELDMAN, *supra* note 90, at 41-48 (highlighting the technical difficulties judges encounter when performing economic analysis).

331. MERGES ET AL., *supra* note 62, at 378; *see* 35 U.S.C. § 284 (2006). Courts have developed a sophisticated jurisprudence for determining damages. *See* Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, 1156 (6th Cir. 1978) (addressing the calculation of lost profits); Ga.-Pac. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970) (defining a fifteen-factor test for calculating a reasonable royalty).

332. For a skeptical view of this approach, see Ellis et al., *supra* note 207, at 446.

333. *Id.* at 465.

334. *Cf. id.* at 465-66. *See generally* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972) (distinguishing between liability rule protection, which is characterized by damages, and property rule protection, which is characterized by injunctions).

liability rules. In short, *eBay* has complicated damages calculations while also making them more common.[335]

Early cases following *eBay* demonstrate the difficult, technologically intensive inquiries now facing district courts. True to Justice Kennedy's direction, courts now assess the relative "importance" of a patented component within a broader product.[336] Additionally, courts now inquire into the impact of a patented invention (and an injunction against infringement) on wider societal interests, such as the availability of computer software,[337] satellite television,[338] and medical diagnostics.[339] Courts now routinely consider industry dynamics, as an injunction is more likely to issue if the patentee and infringer are direct competitors.[340] However, there is no per se rule in this regard, as courts have granted injunctions even in the absence of direct competition[341] as well as denied injunctions in the presence of direct competition.[342] As a general matter, these kinds of competitive harms may be very difficult to quantify.[343]

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335. *See* Ellis et al., *supra* note 207, at 465-71; *id.* at 471 ("[T]hough damages recovery has never been a certain art, a host of new substantive and process issues have arisen.").

336. *See, e.g.*, IMX, Inc. v. Lendingtree, LLC, 469 F. Supp. 2d 203, 225 (D. Del. 2007) ("[D]efendant's infringing use of plaintiff's technology is not limited to a minor component . . . ."); Paice LLC v. Toyota Motor Corp., No. 2:04-CV-211-DF, 2006 WL 2385139 (E.D. Tex. Aug. 16, 2006), *aff'd in part, vacated in part*, 504 F.3d 1293 (Fed. Cir. 2007); z4 Techs., Inc. v. Microsoft Corp., 434 F. Supp. 2d 437 (E.D. Tex. 2006); *see also* Ellis et al., *supra* note 207, at 455-56 (discussing *Paice* and *z4*).

337. *See* z4 Techs., 434 F. Supp. 2d 437.

338. *See* Finisar Corp. v. DirecTV Grp., Inc., No. 1:05-CV-00264, 2006 WL 2037617 (E.D. Tex. July 7, 2006); *see also* David Orozco & James G. Conley, *The "Longer Walk" After* eBay v. MercExchange, 42 LES NOUVELLES 426, 429 (2007) (discussing *Finisar*).

339. *See* Innogenetics, N.V. v. Abbott Labs., 578 F. Supp. 2d 1079, 1105 (W.D. Wis. 2007) (ordering an evidentiary hearing to determine the impact of an injunction on the diagnostic market).

340. Ellis et al., *supra* note 207, at 442-43.

341. *See, e.g.*, Commonwealth Scientific & Indus. Research Org. v. Buffalo Tech. Inc., 492 F. Supp. 2d 600, 603-04 (E.D. Tex. 2007). *eBay* itself held that a patentee's status as a nonmanufacturer did not foreclose the availability of injunctive relief. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 393 (2006).

342. *See, e.g.*, Praxair, Inc. v. ATMI, Inc., 479 F. Supp. 2d 440 (D. Del. 2007).

343. Ellis et al., *supra* note 207, at 445, 447.

G. Additional Evidence of the Supreme Court's Holistic Turn

While I have focused at length on *Festo*, *KSR*, and *eBay* to demonstrate the Supreme Court's "holistic turn," such a trend is best illustrated, of course, by a holistic examination of the Court's decisions. In describing this general pattern, it is important to acknowledge exceptions; some recent Supreme Court opinions—or portions of opinions—have articulated relatively formalistic doctrines.[344] That being said, the holistic turn represents a prominent trend rather than a categorical rule, and additional examples of Supreme Court holism abound.

For instance, in *Merck KGaA v. Integra Lifesciences I, Ltd.*, the Court rejected the Federal Circuit's formalistic interpretation of the 35 U.S.C. § 271(e)(1) exception to patent infringement.[345] That statute exempts from infringement uses of a patented invention "reasonably related" to submitting information for federal regulatory review of drugs.[346] The Federal Circuit had created a bright-line rule limiting the exception to uses that were directly related to an FDA submission.[347] The Supreme Court, however, emphasized the standard-like nature of the statute, noting that it exempts from infringement "*all* uses of patented compounds 'reasonably related' to the process of developing information" for a federal submission.[348] This emphasis on reasonableness—the prototypical flexible standard—further reflects the Supreme Court's holistic tendencies.

In *Quanta Computer, Inc. v. LG Electronics, Inc.*, the Court established a holistic standard for analyzing the doctrine of exhaustion, which provides that

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344. *See, e.g.*, Pfaff v. Wells Elecs., Inc. 525 U.S. 55 (1998) (replacing the Federal Circuit's "totality of the circumstances" test governing the on-sale bar with a more bright-line test); Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 29 (1997) (holding that the doctrine of equivalents is to be applied on an element-by-element basis and not by holistically comparing a claimed and allegedly infringing invention). Commentators have argued that formalistic Supreme Court doctrine in these and other cases has helped facilitate the emergence of formalism at the Federal Circuit. *See, e.g.*, Holbrook, *Supreme Court's Complicity*, *supra* note 132, at 6; Thomas, *supra* note 15, at 781. However, these analyses largely address Supreme Court cases from the late 1990s and early 2000s, such as *Markman II*, 517 U.S. 370 (1996), *Warner-Jenkinson*, and *Pfaff*. Since then, there has been a noticeable upswing in both the number of Supreme Court patent decisions as well as the holistic character of these decisions.

345. 545 U.S. 193 (2005).

346. 35 U.S.C. § 271(e)(1) (2006). The provision thus facilitates the introduction of generic drugs.

347. *See* Integra Lifesciences I, Ltd. v. Merck KGaA, 331 F.3d 860, 867 (Fed. Cir. 2003).

348. 545 U.S. at 206.

the initial authorized sale of a patented invention terminates all patent rights to that item.[349] Among its holdings, the Court expanded upon previous precedent to rule that when an item is legitimately sold that "substantially embodie[s]" a patented invention, the patentee's rights are exhausted.[350] This flexible standard requires a court to inquire into whether a sold item embodies the "inventive" elements of a patent.[351] This somewhat nebulous standard does not insist on exact identity and invites detailed comparisons of patented inventions and commercial products. While other portions of the *Quanta* decision exhibit formalistic qualities,[352] this threshold test for determining the applicability of exhaustion is decidedly holistic.

Most recently, the Court has taken a "holistic turn" with respect to the law of patentable subject matter.[353] In a series of cases culminating in *In re Bilski*, the Federal Circuit articulated a rather formalistic test for the patentability of processes.[354] Under the Federal Circuit's test, a process was eligible for

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349. 128 S. Ct. 2109, 2115 (2008).

350. *Id.* at 2122; *see also* United States v. Univis Lens Co., 316 U.S. 241, 250-51 (1942) (holding patent rights exhausted based on the sale of items that "embodie[d] essential features of [the] patented invention"); Todd Zubler et al., *2008 Patent Law Decisions of the Federal Circuit*, 58 AM. U. L. REV. 747, 758 (2009) (discussing *Quanta* and *Univis*).

351. 128 S. Ct. at 2120.

352. Professor Adam Mossoff characterizes *Quanta* as a formalistic opinion because it states a per se rule that "'the initial authorized sale of a patented item terminates *all* patent rights to that item.'" Mossoff, *supra* note 132, at 373 (quoting *Quanta*, 128 S. Ct. at 2115 (emphasis added)); *see also* Richard A. Epstein, *The Disintegration of Intellectual Property? A Classical Liberal Response to a Premature Obituary*, 62 STAN. L. REV. 455, 510 (2010) (characterizing this ruling as "a pure exercise in idle formalism"). I do not contest this characterization of this part of the opinion, but I focus instead on a threshold question: what must be "sold" to trigger exhaustion? It is here that the Supreme Court endorses a flexible standard, for it requires sale of an item that "substantially embodie[s]" a patented invention rather than exact identity.

353. *See* 35 U.S.C. § 101 (2006) (defining patentable subject matter as "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof").

354. In *State Street Bank & Trust v. Signature Financial Group*, the Federal Circuit established a highly expansive and formalistic conception of patentable subject matter, essentially equating patent eligibility with utility. 149 F.3d 1368, 1375 (Fed. Cir. 1998). However, at least one Supreme Court Justice expressed discomfort both with the breadth of patentable subject matter embodied in this test and the bluntness of the inquiry. *See* Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124, 126 (2006) (Breyer, J., dissenting from dismissal of writ of certiorari). Perhaps in response, the Federal Circuit developed the "machine-or-transformation" test, which considers more characteristics of the invention at issue but is still rather formalistic in nature. *See In re* Comiskey, 499 F.3d 1365 (Fed. Cir. 2007), *revised and superseded by* 554 F.3d 967 (Fed. Cir. 2009); *In re* Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc) (articulating the machine-or-transformation test); *see also* John F.

patenting only if "(1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing."[355] Recently, in *Bilski v. Kappos*, the Supreme Court rejected the "machine-or-transformation test" as the sole determinant of process patentability.[356] In its opinion, the Court also rejected another formalistic constraint on patentable subject matter: a bright-line exclusion for business methods.[357] Instead, the Court relied on longstanding doctrine holding that "abstract ideas" are not patentable subject matter.[358] Of course, defining what constitutes an "abstract idea" is a rather cognitively challenging task, particularly in unfamiliar technical fields. Additionally, by their very nature, such inquiries tend to be holistic rather than formalistic. Abstract ideas represent "the basic tools of scientific and technological work,"[359] and an invention's characterization as an abstract idea may depend on its relationship to broader, industry-wide developments and technological progress. Ultimately, by invoking an "abstraction" approach to patentable subject matter and rejecting exclusive formalistic tests, the Court has invited deeper judicial engagement with inventions and their context. In so doing, it has continued its holistic turn.

In sum, the Supreme Court's recent forays into patent law have consistently favored holistic standards over formalistic rules. This innovation compels greater engagement between district judges and technological context. Whereas Federal Circuit formalism allows judges to function as cognitive misers, the Supreme Court's holistic turn has the opposite effect.

V. DOCTRINAL INFORMATION-COST EXTERNALITIES: IMPLICATIONS AND PRINCIPLES FOR MITIGATION

Returning to the central theme of this Article, the Supreme Court's holistic turn presents a challenge. Employing holistic standards rather than formalistic rules promises to increase cognitive burdens for district judges. In particular, "information-demanding" standards compel greater judicial engagement with complex technologies. One predictable response to this development will be

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Duffy, *Rules and Standards on the Forefront of Patentability*, 51 WM. & MARY L. REV. 609, 611-12 (2009) (describing the rule-like nature of the machine-or-transformation test).

355. 545 F.3d at 954.

356. 130 S. Ct. 3218, 3221 (2010). The Court also cast doubt on the Federal Circuit's earlier articulation of patentable subject matter in *State Street*. *Id.* at 3231.

357. *Id.* at 3222.

358. *Id.*; *see* Diamond v. Diehr, 450 U.S. 175 (1981); Parker v. Flook, 437 U.S. 584 (1978); Gottschalk v. Benson, 409 U.S. 63 (1972).

359. *Benson*, 409 U.S. at 67.

greater emphasis on "traditional" proposals to reduce such burdens.[360] As we have seen, these proposals face a variety of shortcomings.

The foregoing discussion of formalism and holism, however, suggests a different approach. Rather than enhancing judicial technical expertise or simplifying the language of patents, this Part argues that patent *doctrine* itself can play an important role in facilitating lay engagement with technology. In particular, this Part offers prescriptions for crafting Supreme Court opinions so as to reduce the "costliness" of holistic standards. In so doing, it aims to blend some of the economizing virtues of rules with the flexibility and contextual sensitivity of standards.

As we have seen, the Supreme Court consistently favors broad standards that compel difficult technological inquiries by lay adjudicators. However, because of the Court's relatively small patent docket, Supreme Court Justices themselves rarely have to apply these standards. Thus, the Court is free to announce broad, policy-oriented standards without considering the difficulties of applying them in myriad technological contexts. In an economic sense, the Court's preference for standards imposes an information-cost externality on district judges.[361] To the extent that these costs are unduly burdensome, it may be helpful to enhance the Court's internalization of these externalities.[362]

If information costs are the problem, then providing more information in Supreme Court patent opinions may offer a solution. To achieve this end, this Part proposes adapting a fundamental concept from patent law itself:

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360. *See supra* Section I.B.

361. I use "externality" here to describe a cost imposed on a third party by an entity who does not (fully) account for that cost in making a decision. *See* Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 348 (1967). In this sense, appellate courts impose externalities on lower courts whenever they articulate new doctrine without duly considering the difficulties of applying it. While this phenomenon is not unique to patent law, I would contend that the information-cost externalities of broad, nebulous standards are accentuated when courts must apply them to technological subject matter.

362. I do not argue that the Court should *fully* internalize doctrinal information-cost externalities; such an endeavor is neither possible nor desirable. Among other considerations, such externalities are part and parcel of an appellate system where the Supreme Court decides major interpretative issues while often leaving the task of filling in the details to lower courts. *See infra* notes 404-405 and accompanying text. Furthermore, in some situations, whether because of the subject matter at hand or to preserve flexibility, the Court should conscientiously refrain from creating bright-line rules. *See, e.g.*, Bilski v. Kappos, 130 S. Ct. 3218, 3229 (2010) (declining to adopt "categorical rules that might have wide-ranging and unforeseen impacts"). Ultimately, my argument is not an invitation for the Court to create rules per se, but an admonition that the Court should think more about the costs imposed by holistic standards on lower courts.

enablement. The enablement requirement arises from 35 U.S.C. § 112, which states:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same . . . .[363]

In patent law, enablement is an "information-forcing" rule.[364] It compels patentees to adopt the perspective of ordinary artisans in the field and to disclose their inventions so that such parties can practice them.[365] Patents fail the enablement requirement when, for example, a PHOSITA must engage in "undue experimentation" to make or use an invention.[366]

This Article proposes applying enablement principles to Supreme Court patent opinions. In patent law, the enablement requirement compels patentees to teach persons of ordinary skill in the art to make and use a new invention. By analogy, patent opinions announce doctrinal innovations, and enablement principles would ensure that persons of ordinary skill in legal arts (such as judges) could apply them.[367] Such an orientation would encourage Supreme Court Justices to step into the shoes of a district court judge and consider the day-to-day demands of applying patent doctrine to unfamiliar inventions. As in the patent context, enablement would be an information-forcing principle. In particular, it would encourage Supreme Court Justices to consider, limit, and guide "costly" technological inquiries when articulating new patent doctrine.

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363. 35 U.S.C. § 112, para. 1 (2006).

364. Kevin Emerson Collins, *The Reach of Literal Claim Scope into After-Arising Technology: On Thing Construction and the Meaning of Meaning*, 41 CONN. L. REV. 493, 506 (2008).

365. *See* Holbrook, *supra* note 194, at 128-30; *see also* Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539 (2009) (detailing the benefits of disclosure and advocating a robust disclosure requirement).

366. *See In re* Wands, 858 F.2d 731, 737 (Fed. Cir. 1988) (articulating several factors defining "undue experimentation"); *see also* The Incandescent Lamp Patent, 159 U.S. 465, 475 (1895) (invalidating patent claims that could only be practiced by "the most careful and painstaking experimentation").

367. *Cf.* Schwartz, *supra* note 54, at 225 (noting the implicit assumption that higher courts should be able to "teach" lower courts how to apply new doctrine); *Law Professor Calls for 'Dialogue' Between Federal Circuit and Supreme Court*, 78 Pat. Trademark & Copyright J. (BNA) No. 1939, at 792, 793 (Oct. 30, 2009) [hereinafter *Law Professor Calls for 'Dialogue'*] (quoting Professor Joshua Sarnoff as characterizing Supreme Court patent cases as "weak on teaching policy").

While this comparison to patent enablement provides helpful guidance, it is important not to draw this analogy too narrowly. I do not mean to suggest any exclusive connection between patent law and the virtues of greater detail; the invocation of patent enablement merely emphasizes a heightened sensitivity to practical administrability that may benefit other areas of Supreme Court jurisprudence as well. Indeed, to the extent that observers routinely criticize Supreme Court opinions for articulating vague, unworkable tests, a proposal to provide greater clarity and instruction is not entirely novel.[368] I do contend, however, that the benefits of greater Supreme Court guidance are particularly salient to patent law. Applying broad, factually intensive standards is always cognitively demanding, but it is particularly demanding when judges must apply them to innovative technologies.

Applying enablement principles to Supreme Court patent opinions would reduce information costs in several ways. First, it would encourage clearer doctrinal frameworks. Vague doctrine always heightens information costs, particularly in the technological sphere, as it expands the universe of potentially relevant legal inquiries. Providing clear, structured doctrine would help define and limit these inquiries. Second, an enablement orientation would encourage authoring Justices to guide the application of new doctrine with examples and explanations.

A. Clearly Delineating and Structuring New Patent Doctrine

An important step in "enabling" patent doctrine is clearly articulating it. Unfortunately, the Supreme Court often produces rather nebulous patent doctrine. Professor Donald Chisum argues that the Court should "provide reasonably clear standards and make some effort to give us a standard that makes sense in terms of reality."[369] Frequently, the Court "creates the test, but it [does] not sit down and methodically construct the test and explain it to us."[370] Commenting on the Court's more recent decisions, Professor Timothy

368. *See, e.g.*, Kansas v. Crane, 534 U.S. 407, 423 (2002) (Scalia, J., dissenting) (criticizing the majority's interpretation of the Kansas Sexually Violent Predator Act as giving "trial court[s] . . . *not a clue* as to how they are supposed to charge the jury!"); William A. Fletcher, *The Structure of Standing*, 98 YALE L.J. 221, 290 (1988) ("One way of describing the Court's mistake in standing cases is to say that it has tried to formulate principles at too high a level of generality.").

369. Chisum, *supra* note 15, at 7.

370. *Id.*

Holbrook observes, "Nearly every patent case decided is unanimous, yet the opinions remain rather vague and unsatisfying."[371]

Such criticisms are particularly applicable to the Court's recent pronouncements on nonobviousness. In *KSR v. Teleflex*,[372] the Court clearly rejected the Federal Circuit's rigid application of the TSM test. However, it is not clear what new standard of nonobviousness replaces the Federal Circuit's approach, if any.[373] One can identify numerous "fleshy" statements from the Court's opinion,[374] but the precise rule of decision remains elusive. In a sense, *KSR* says both too much and too little. It offers a smorgasbord of factors to consider in the nonobviousness determination, but it does not present them in a systematic, prioritized, or weighted manner. Given that so much now appears

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371. Holbrook, *supra* note 219, at 25.

372. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

373. *See* Gregory N. Mandel, *Another Missed Opportunity: The Supreme Court's Failure To Define Nonobviousness or Combat Hindsight Bias in* KSR v. Teleflex, 12 LEWIS & CLARK L. REV. 323, 326 (2008) ("Despite issuing eight opinions on the nonobviousness requirement, the Court has provided almost no guidance concerning either the degree of ingenuity necessary to meet the . . . non-obvious standard or how a decision-maker is supposed to evaluate whether the differences between the invention and the prior art meet this degree."); Petherbridge & Wagner, *supra* note 194, at 2107.

374. *See, e.g.*, 550 U.S. at 415 ("[O]ur cases have set forth an expansive and flexible approach inconsistent with the way the Court of Appeals applied its TSM test here."); *id.* at 416 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."); *id.* at 417 ("When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill."); *id.* ("[A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions."); *id.* at 418 ("Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue."); *id.* ("[A] court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ."); *id.* at 420 ("[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed."); *id.* at 421 ("A person of ordinary skill is also a person of ordinary creativity, not an automaton."); *id.* ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.").

to be fair game in determining nonobviousness, the information costs of applying this new standard are very high.

Perhaps most importantly, *KSR* does not precisely identify the specific *types of information* that should guide nonobviousness inquiries. In the *Graham* framework, courts should consider: (1) "the scope and content of the prior art"; (2) the "differences between the prior art and the claims at issue"; (3) "the level of ordinary skill in the pertinent art"; and (4) secondary considerations.[375] While much falls within these categories, this structure attempts to cabin the informational sources informing nonobviousness determinations. *KSR*, however, advances a "liberal view of sources of information relevant to an obviousness analysis."[376] This lack of doctrinal precision invites wide-ranging judicial inquiries into technical issues such as evolving industry trends and the creative faculties of the PHOSITA.

To remedy this deficiency, the Court should be more sensitive to the information demands of broad standards. One helpful approach in this regard would involve analytically deconstructing standards into discrete subtests.[377] While *Graham* has been criticized as vague, it took the helpful step of distilling the nebulous statutory requirement of "nonobviousness" into a set of smaller, more manageable inquiries.[378] *KSR* was an opportunity to flesh out the details of this framework, but the Court chose not to fit its pronouncements within this structure.

While more clearly structured frameworks are helpful, long lists of factors to consider may ultimately raise information costs rather than reduce them. The Court could address this deficiency in several ways. In general, authoring Justices should be sensitive to the type and amount of information that various legal inquiries "consume." For example, Justice Kennedy's opinion in *KSR* noted that "a design need or market pressure" coupled with a "finite number of identified, predictable solutions" is likely to render a particular solution obvious.[379] However, the opinion offers no guidance on how to identify a "design need" or "market pressure." Additionally, it is unclear what quantity of solutions may still constitute a "finite" number. These hurdles could be mitigated by simply eliminating subtests that have low probative value relative

375. Graham v. John Deere Co., 383 U.S. 1, 17 (1966).

376. R. Polk Wagner, *The Supreme Court and the Future of Patent Reform*, FED. LAW., Feb. 2008, at 35, 41.

377. *Cf.* Guthrie et al., *supra* note 97, at 41 (suggesting that multifactor tests and checklists, although imperfect, may encourage more deliberative adjudication).

378. *Graham*, 383 U.S. at 17-18.

379. *KSR*, 550 U.S. at 421.

to their difficulty of application. Additionally, the Court could mitigate these deficiencies by providing examples and explanations, a proposal I address in the next Section.

Perhaps more importantly, the Court could enable new patent doctrine by assigning weights to particular subtests within a doctrinal framework. Turning again to *KSR*, the Court should have both adopted the organizing structure of the *Graham* framework and assigned weights to various inquiries within that framework. In particular, the Court should have clarified the importance of secondary considerations, such as commercial success, in nonobviousness determinations. In *Graham*, the Court noted that secondary considerations "may have relevancy."[380] This statement underscores the "secondary" nature of such inquiries, and it seems to conflict with subsequent Federal Circuit jurisprudence stating that courts *must* consider such factors.[381] Clarifying the importance of secondary considerations would have helped enable nonobviousness determinations going forward. Similarly, in the wake of *KSR*, the probative value of the TSM test is not entirely clear. The Court noted that the TSM test "may have relevancy,"[382] but declined to define its precise importance.

In a general sense, the Court is, in fact, capable of providing greater definition in its patent opinions. In *eBay*, for example, the Court provided a discrete set of factors that courts should consider in granting or denying an injunction.[383] Arguably, the Court should have gone further to assign particular weights to the various factors.[384] Nevertheless, by identifying a finite universe of factors, the Court helped limit the range of technologically intensive inquiries that courts must make.[385]

While standards necessarily involve high information costs, precisely defining those standards would help mitigate those costs. This is not a call for

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380. *Graham*, 383 U.S. at 18.

381. Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1380 (Fed. Cir. 1986).

382. *Graham*, 383 U.S. at 18.

383. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391 (2006).

384. *See* Smith, *supra* note 160, at 2125. As Professor John Golden notes, at a minimum, the *eBay* framework requires that a plaintiff show that each of the four factors favors, or at least does not disfavor, granting an injunction. Golden, *supra* note 15, at 696; *see eBay*, 547 U.S. at 391. However, the Court could have provided useful guidance as to which factors (if any) are most important for crossing the ultimate threshold triggering injunctive relief. To further guide lower courts' application of *eBay*, the Court could have also articulated presumptions relating to one or several of the equitable factors. *See* John M. Golden, *Principles for Patent Remedies*, 88 TEX. L. REV. 505, 579 (2010).

385. *Cf.* Kaplow, *supra* note 143, at 594 ("[S]tandards need not admit all considerations.").

the Supreme Court to adopt rules per se. Rather, this proposal is situated in the Supreme Court's commitment to standards, but it strives to make those standards more workable through clarifying, structuring, and prioritizing legal inquiries. In this manner, by conscientiously fulfilling its mandate "to say what the law is,"[386] the Court can help facilitate lay adjudication of technological disputes.

B. Guiding Technological Inquiries Through Examples and Explanations

While it is useful to describe a new legal innovation, it is even more useful to teach jurists how to apply it. In addition to providing clear, bounded frameworks, an enablement orientation would encourage the Supreme Court to illustrate and explain new doctrine.

Examples would play a key role within this enablement orientation. Commenting on patent enablement, the Federal Circuit has stated, "One of the best ways to teach a person of ordinary skill in the art how to make and use the invention is to provide an example of how to practice the invention in a particular case."[387] Providing illustrative examples in Supreme Court opinions would help district courts apply innovative patent standards. In so doing, it would limit and guide "costly" inquries into complicated subject matter.

When the Supreme Court speaks, lower courts listen. In particular, district courts have been highly receptive to specific examples provided in Supreme Court patent opinions. Recall *Festo VIII*, where the Court replaced the Federal Circuit's complete bar approach to prosecution history estoppel with a flexible bar. In elaborating this standard, the Court offered several examples where patentees could rebut the presumption of prosecution history estoppel.[388] As shorthand, we can refer to these as the unforeseeability, tangentialness, and "other reason" exceptions.[389] District courts have embraced the first two—rather concrete—examples, declining to apply prosecution history estoppel in

386. Marbury v. Madison, 5 U.S. (1 Cranch) 137, 177 (1803).

387. Phillips v. AWH Corp., 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc). In similar fashion, the Board of Patent Appeals and Interferences has stated, "While we recognize that specific examples are not necessary to meet the requirements of Section 112, when present, they do provide good evidence that the disclosure is enabling and that the invention may be performed without undue experimentation." *In re* Strahilevitz, 668 F.2d 1229, 1231 (C.C.P.A. 1982) (citation omitted).

388. *See supra* note 259 and accompanying text.

389. *See Festo VIII*, 535 U.S. 722, 740-41 (2002).

cases involving unforeseen technologies[390] and narrowing amendments that were tangential to an equivalent in question.[391] Tellingly, no reported decisions include the more nebulous "other reason" exception.

Examples play a similarly instructive role in district courts' application of *eBay*. In his concurrence, Justice Kennedy identified several situations that warranted denying injunctive relief, including cases involving nonmanufacturing entities[392] (known pejoratively as "patent trolls") and instances where a patented invention is only one component of a broader technology.[393] Lower courts have seized upon both of these examples. One study shows that in almost every early post-*eBay* case where a district court denied injunctive relief, the patentee was a nonpracticing entity.[394] Additionally, in two of the six cases where a district court denied injunctive relief, the patented invention was only one component of a broader technology.[395] While further empirical work is needed, early evidence indicates that Supreme Court examples do in fact guide (and limit) lower courts' application of new patent doctrine.

The Supreme Court's use of examples lowers information costs in several ways. As a general matter, examples provide concrete guidance to a district court when applying a new, holistic standard. This guidance, however, assumes particular importance when the inquiries at issue involve technological subject matter. Regarding *Festo*, a simple admonition to determine when an "amendment cannot reasonably be viewed as surrendering a particular equivalent" invites a multitude of inquiries into the state of the art at particular times as well as the perspective of a PHOSITA.[396] Similarly, a precisely articulated *eBay* framework would be more difficult to apply in the absence of

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390. *See, e.g.*, Glaxo Wellcome, Inc. v. Eon Labs Mfg., Inc., No. 00 Civ.9089 LMM, 2002 WL 1874831 (S.D.N.Y. Aug. 13, 2002) (denying summary judgment based on prosecution history estoppel because the patentee had raised a material issue of fact regarding foreseeability).

391. *See, e.g.*, Blunt Wrap U.S.A., Inc. v. Royal Blunts, Inc., No. Civ.A. 02-1990, 2003 WL 30422, at *10 (E.D. La. Jan. 2, 2003) (finding prosecution history estoppel inapplicable because, inter alia, the amendment at issue was tangential to the equivalent in question); Shane Grp., Inc. v. BCI Burke Co., No. 1:02-CV-58, 2002 WL 32059737, at *5 (W.D. Mich. Aug. 12, 2002) (same).

392. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 396 (2006) (Kennedy, J., concurring).

393. *Id.* at 396-97.

394. Beckerman-Rodau, *supra* note 322, at 654-55.

395. *Id.*; *see* Paice LLC v. Toyota Motor Corp., No. 2:04-CV-211-DF, 2006 WL 2385139 (E.D. Tex. Aug. 16, 2006); z4 Techs., Inc. v. Microsoft Corp., 434 F. Supp. 2d 437 (E.D. Tex. 2006).

396. *Festo VIII*, 535 U.S. 722, 740 (2002).

illustrative examples mentioned in the majority opinion and concurrences. Again, this is not an argument to adopt rules per se, but to economize on information costs by elaborating and illustrating standards.

Ultimately, clearly defined frameworks coupled with illustrative examples blend the virtues of both rules and standards. While holistic standards permit valuable flexibility and contextual consideration, they can impose high information costs. Formalistic rules are more cognitively economical, but they can be overly blunt and rigid. Focusing on doctrinal enablement would encourage the Court to articulate doctrine that is clear, limited, and accessible. In so doing, the Court can help internalize some of the information-cost externalities it normally imposes on lower courts.

C. Objections and Responses

Of course, this proposal to apply enablement principles to Supreme Court patent opinions must address several criticisms. The most obvious objection is that it is unenforceable. While the threat of losing patent protection motivates inventors to enable their inventions, no sanction will befall Justices of the Supreme Court who do not enable their doctrinal innovations. Of course, reputational and professional interests in facilitating patent adjudication will hopefully motivate Justices to consider enablement. Recently, the Court has shown great interest in modifying substantive patent doctrine; to ensure faithful application of new doctrine, the Court would be well served to consider the methodological and cognitive dimensions of its rulings.

However, this proposal may best be understood as a prescription for exogenous parties influencing the Court. First, parties litigating before the Supreme Court, as well as amici curiae, should consider the limitations of lay adjudicators when advocating particular interpretations of patent law. An emphasis on practical application would lead these parties to suggest clear, bounded standards as models for Supreme Court decisions. Second, more ambitiously, consideration of cognitive burdens should inform congressional discussions of patent reform. Along these lines, former Chief Judge Paul Michel of the Federal Circuit has actively lobbied against legislative reforms that would enhance the complexity of damages calculations.[397] As a general matter, members of Congress should consider the information costs of Supreme Court standards when reviewing various areas of patent law.

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397. Letter from Paul R. Michel, Chief Judge, Fed. Circuit, to Sen. Patrick Leahy & Sen. Orrin G. Hatch 2 (May 3, 2007) [hereinafter Michel Letter], *available at* http://www.patentsmatter.com/media/issue/legislation/20070503_Michel.pdf.

This proposed emphasis on enablement—and particularly the use of illustrative examples—is also subject to more substantive critiques. First is the well-established criticism that courts should only decide the case before them and not resolve hypothetical disputes.[398] As Felix Frankfurter warned in the context of constitutional litigation, "Every tendency to deal with [legal contests] abstractedly, to formulate them in terms of sterile legal questions, is bound to result in sterile conclusions unrelated to actualities."[399] Certainly, a full-blown analysis of hypothetical situations not before the Court would be inappropriate. Again, it would be both impossible and undesirable for the Court to try to anticipate all potential applications of new doctrine.[400] However, the "hypothetical" nature of an opinion is a question of degree, not kind. While drawing bright lines is somewhat difficult, simply providing guiding principles does not constitute an "advisory" opinion that should trigger Frankfurter's concerns.

Take, for example, *eBay*. In elaborating the equitable standard for injunctive relief in patent cases, Justice Thomas's majority opinion ranged well beyond MercExchange's asserted patent on a system of online auctions. For instance, it noted that independent inventors and universities should not be foreclosed from obtaining injunctive relief merely because they prefer to license, rather than practice, their patents.[401] This was clearly dicta not essential to the resolution of the case. However, it did not pronounce categorical legal conclusions based on hypothetical facts. Rather, it provided helpful guidance that lower courts can consult when applying the *eBay* standard to new factual predicates.[402] Particularly at the level of the Supreme Court, the importance of patent litigation often ranges far beyond the two parties paying the legal bills. Supreme Court patent rulings have an enormous impact on inventors,

398. *See* Plager & Pettigrew, *supra* note 297, at 1750.

399. Felix Frankfurter, *A Note on Advisory Opinions*, 37 HARV. L. REV. 1002, 1003 (1924); *see also Patent System Major Problems*, *supra* note 77, at 101 ("[W]e're not a legislature. . . . We really can't rove around . . . to speak about issues not raised in a particular case . . . .") (statement of Hon. Alan Lourie).

400. *See supra* note 362.

401. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 393 (2006).

402. Similarly, merely noting that courts determining injunctive relief should consider the manufacturing character of a patentee or that a patented invention is a component of a broader technology falls within the scope of appropriate judicial guidance. *See id.* at 396 (Kennedy, J., concurring).

businesses, lawyers, and courts, and providing guidance beyond the narrow confines of the parties' facts may be wholly appropriate.[403]

Second, some might argue that focusing on enablement would lead the Supreme Court to overstep its institutional role in articulating patent doctrine. In the traditional paradigm, Congress enacts patent legislation, the Supreme Court provides high-level interpretation of important questions, and the Federal Circuit elaborates the details of patent law on a day-to-day level.[404] This structure gives rise to several potential critiques. First, the Supreme Court may be overstepping its role by providing too much detail in its opinions. Because of institutional competence concerns, it may be preferable to allow the Federal Circuit to grapple with the nitty-gritty details of patent doctrine.[405] However, this objection merely accentuates the need for reform. If the Supreme Court is truly ill suited to articulate patent doctrine, then it should either refrain from doing so (which has significant drawbacks) or invest the time, energy, and foresight to grapple with new doctrines and their myriad implications. Focusing on doctrinal enablement encourages precisely this type of "grappling."

Additionally, expanding on an earlier point, skeptics might doubt the technical competence of the Supreme Court to fully grapple with patent doctrine. This critique might highlight a perceived circularity in the proposal advanced here: given that generalist district judges struggle to understand technology, why should Supreme Court Justices be any better at this task? Certainly, Supreme Court Justices should consider the technological complexity of a patent dispute, as well their ability to comprehend it, when crafting new doctrine. However, it bears emphasizing that doctrinal

403. *See* Bilski v. Kappos, 130 S. Ct. 3218, 3232 (2010) (Stevens, J., concurring) ("I agree with the Court that, in light of the uncertainty that currently pervades the field, it is prudent to provide further guidance.").

404. *See* Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 40 (1997) ("We expect that the Federal Circuit will refine the formulation of the test for equivalence in the orderly course of case-by-case determinations."); *cf.* Symposium, *Panel I: The End of Equivalents? Examining the Fallout from* Festo, 13 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 727, 738 (2003) (advocating incremental, case-by-case elaboration of doctrine). Furthermore, the PTO may also help clarify patent law, as it did following the Supreme Court's decision in *KSR*. *See* Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57,526 (Oct. 10, 2007).

405. The Court itself has articulated this sentiment. *See Warner-Jenkinson*, 520 U.S. at 40 (declining to "micromanag[e] the Federal Circuit's particular word choice for analyzing equivalence" and "leav[ing] such refinement to that court's sound judgment in this area of its special expertise"); *see also* Nard & Duffy, *supra* note 132, at 1663 (citing the advantages of "open" Supreme Court opinions that can accommodate future developments in the law).

enablement focuses not so much on a Justice's knowledge of particular technologies per se, but on her awareness of the burdens of applying new patent doctrine to sophisticated technologies in general. Put differently, a Justice need not be an expert in biotechnology, computer science, or mechanical engineering to recognize that broad, vague standards impose high information costs on lower courts adjudicating patent cases.

Third, some might suggest that the "defect" identified here is self-correcting. Indeed, over time, the accumulation of common law precedents may lead standards to naturally crystallize into brighter-line rules.[406] Self-correction notwithstanding, there is much value to be gained from conscientious, ex ante definition of legal standards. The Supreme Court is the ultimate judicial authority on patent law, and greater sensitivity to the technological challenges of patent adjudication promises to create clearer, more administrable doctrine in the first instance.

Finally, while I have focused on the cognitive difficulties borne by district judges, some would argue that this focus is misplaced. After all, the Supreme Court should interpret patent doctrine in light of the constitutional prerogative to "promote the progress of useful arts," not necessarily to ease cognitive burdens on judges. Put differently, in crafting patent doctrine, ease of administration is only one objective that must be balanced against others, including the desire to achieve accurate outcomes. However, the question of whether courts are "accurately" applying patent doctrine becomes meaningless if that doctrine is overly indeterminate. More substantively, the "trade off" between accuracy and ease of administration may in some contexts be overstated. Broad standards that admit a wide range of technical inquiries may not necessarily promote accuracy if those inquiries overwhelm lay adjudicators. Indeed, providing clear doctrine and structured guidance to lower courts may, in certain contexts, promote both ease of administration and accuracy. While it is certainly true that the aim of law is not to be easily administered, if it is not easily administered, it is unlikely to achieve its aims.

406. *See* Kaplow, *supra* note 143, at 564, 578-79; Schlag, *supra* note 142, at 413; *cf.* Carol M. Rose, *Crystals and Mud in Property Law*, 40 STAN. L. REV. 577 (1988) (exploring the cyclical emergence of bright-line rules (crystals) and more ambiguous rules of decision (mud)). *Compare Festo VIII*, 535 U.S. 722 (2002) (holding that prosecution history estoppel operates as a functional bar), *with Festo IX*, 344 F.3d 1359 (Fed. Cir. 2003) (en banc) (fleshing out specific applications of the flexible bar).

VI. THE TWO CULTURES REFASHIONED: THE FEDERAL CIRCUIT AND THE SUPREME COURT

Ultimately, this study of the cognitive burdens of district court judges concludes by considering the relationship between two appellate courts: the Federal Circuit and the Supreme Court. This Article has used the trope of the Two Cultures to characterize generalist judges' difficulties with technological engagement. However, the notion of the Two Cultures is relevant in another sense as well. In large part, it describes the methodological divergence of the formalistic Federal Circuit and the holistic Supreme Court.[407] This Part concludes by exploring cultural tensions between these important institutions and their implications for patent doctrine.

The proper role of the Supreme Court vis-à-vis the Federal Circuit has attracted significant commentary.[408] To a large degree, observers have proposed a limited role for the Supreme Court.[409] For some, this view arises from the Court's perceived incompetence in patent affairs. Professor Chisum characterized many Supreme Court patent decisions of the late 1990s as "weak, illogical, ambiguous, or inconsistent."[410] Professor Mark Janis has advocated a "managerial" role for the Supreme Court in which it: (1) only reviews patent issues involving "a compelling issue of the allocation of power among institutional actors" and (2) confines its opinions to the "rationale for intervention."[411] Similarly, Professor John Duffy argues that the Court should focus on institutional issues, adhere to precedent, and refrain from leading substantive doctrinal change.[412] More recently, Professor John Golden has suggested that the Court should serve as the "prime percolator" rather than the "final law sayer" for patent matters.[413] Within this view, the Court should limit intervention to areas where Federal Circuit precedent has unduly "frozen"

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407. *Cf.* Kennedy, *supra* note 139, at 1710 ("[T]he arguments pro and con the use of rules have powerful overtones of substantive debates about what values and what visions of the universe we should adopt.").

408. *See, e.g.*, Rebecca S. Eisenberg, Commentary, *The Supreme Court and the Federal Circuit: Visitation and Custody of Patent Law*, 106 MICH. L. REV. FIRST IMPRESSIONS 28 (2007), http://www.michiganlawreview.org/firstimpressions/vol106/eisenberg.pdf.

409. *See* Duffy, *supra* note 15, at 342 (suggesting that the Supreme Court should "recogniz[e] the limitations of its expertise and refrain[] from trying to lead the development of the law").

410. Chisum, *supra* note 15, at 4.

411. Janis, *supra* note 15, at 408.

412. Duffy, *supra* note 15, at 301-05.

413. Golden, *supra* note 15, at 662.

patent doctrine.[414] In most of these formulations, the Supreme Court is an infrequent and modest intervener in patent affairs, leaving control largely to the Federal Circuit.

Unlike some of these other accounts, this Article does not propose substantive guidelines for determining when the Supreme Court should intervene in patent affairs. Rather, it offers methodological prescriptions to guide the Court during its chosen interventions.[415] It accepts as a descriptive and normative matter that the Supreme Court has an important role to play in articulating patent doctrine. However, it suggests that when doing so, the Supreme Court should be aware of the "costly" nature of broad standards and their implications for patent adjudication by generalist judges. This proposal seeks to retain the value of a flexible, holistic approach to patent law while providing guidance to district judges facing highly technical inquiries. This Part probes deeper to examine the cultural underpinnings of the Supreme Court's divergence from the Federal Circuit. In so doing, it explores a connection between generalism and holism, on the one hand, and specialization and formalism, on the other.

The Supreme Court's recent forays into patent law give rise to two somewhat paradoxical observations. First, in some sense, the Supreme Court has much more in common with district courts than those courts have in common with the Federal Circuit. Like the typical district court, the Supreme Court hears relatively few patent disputes.[416] Far from being a quasi-specialized court like the Federal Circuit, the Supreme Court's wide-ranging jurisdiction more closely parallels that of district courts.[417] The Supreme Court's generalist orientation thus offers a "commonsense" check on the more specialized, technically expert Federal Circuit.[418] This perspective is most apparent in *KSR*

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414. *Id.*

415. *See supra* Part V.

416. *See* Burk & Lemley, *supra* note 43, at 1196 ("The average judge may hear no more than one patent case every few years."); S. Jay Plager, *Abolish the Court of Federal Claims? A Question of Democratic Principle*, 71 GEO. WASH. L. REV. 791, 796-97 (2003) (noting that the obscurities of patent law, the complexities of new technologies, and the infrequency of patent cases make such matters particularly difficult for district judges). Out of seventy-seven cases argued during the Supreme Court's 2009 Term, only one (*Bilski v. Kappos*, 130 S. Ct. 3218 (2010)) substantively dealt with patent law. *See Argument Transcripts*, SUP. CT. U.S., http://www.supremecourt.gov/oral_arguments/argument_transcripts.aspx (last visited Sept. 8, 2010).

417. *But see* Golden, *supra* note 15, at 688 (noting the highly selective docket of the Supreme Court and disputing its characterization as a true generalist tribunal).

418. *Cf.* Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124, 138 (2006) (Breyer, J., dissenting from dismissal of writ of certiorari) ("[A] decision from this generalist Court

v. Teleflex, which privileges commonsense assessments of nonobviousness at the expense of technical frameworks like the TSM test.[419]

In another sense, however, the Supreme Court is very distant from district courts. Unlike district judges, Justices of the Supreme Court do not manage complicated factfinding.[420] The Justices rarely struggle with construing claims and determining prosecution history estoppel, nonobviousness, or the appropriateness of injunctive relief. Furthermore, the Court may be somewhat shielded from the most complex inventions; one criterion for seeking Supreme Court review of patent cases is that the underlying technologies are relatively simple.[421] As such, while injecting seemingly "commonsense" standards into patent law, the Supreme Court is significantly insulated from having to apply them in more complicated settings.

This situation represents a perfect storm for producing "costly" Supreme Court patent law. The generalist Court approaches technology as a neophyte, and it establishes broad standards in patent law. While these standards may have commonsense appeal, they create high information costs for those who must apply them. However, the Court, because of its limited docket, is largely insulated from these costs.

On a related note, the Court's relative insulation from patent law, as well as its generalist outlook, has made it skeptical of patent "exceptionalism." Earlier, we saw that the Federal Circuit's traditional, bright-line approach to infringement remedies reduced technological engagement by courts. However, in *eBay*, the Supreme Court clarified that the same equitable standards apply to injunctions in patent cases as in any other type of dispute.[422] Nowhere in the opinion did the Court acknowledge the higher information costs that this framework would produce in the patent context. Rather, the Court was more

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could contribute to the important ongoing debate, among both specialists and generalists, as to whether the patent system . . . adequately reflects the 'careful balance' that 'the federal patent laws . . . embod[y].'" (quoting Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 146 (1989))).

419. *See* KSR Int'l Co. v. Teleflex, Inc., 550 U.S. 398, 421 (2007).

420. *Cf.* Duffy, *supra* note 15, at 329 ("[P]atent cases . . . are likely to involve a great amount of technological detail that the Court is ill-suited to evaluate.").

421. *Cf.* Brief of Twenty-Four Intellectual Property Law Professors as Amici Curiae in Support of Petitioner at 15, KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007) (No. 04-1350), *available at* http://patentlaw.typepad.com/patent/ksramicus.pdf (stating that *KSR* is "an excellent vehicle" because, among other reasons, it "involves simple technologies").

422. Dreyfuss, *What the Federal Circuit Can Learn*, *supra* note 15, at 795; Wendy R. Stein, *The Supreme Court* eBay *Decision: Eliminating Special Rules in Patent Cases*, INTELL. PROP. TODAY, Oct. 2006, at 18.

interested in conforming patent law to broader legal doctrines and principles.[423]

The Federal Circuit, which manages patent law on an everyday level, offers an illuminating contrast. The Federal Circuit's proximity to everyday litigation provides it with a deeper appreciation of technological complexity as well as the information costs of patent adjudication. For example, the Federal Circuit's concerns over "workability" led to its short-lived "complete bar" approach to prosecution history estoppel.[424] Furthermore, as noted, former Chief Judge Paul Michel has argued against patent damages reforms that would compel courts to perform difficult valuations of new technologies.[425] Accordingly, the Federal Circuit's appreciation for the demands of patent adjudication informs its formalistic, inquiry-truncating doctrine.[426] Thus, the cultural orientations of the Federal Circuit and the Supreme Court, one based on specialization and the other based on generalism, help explain their respective methodological preferences for formalism and holism.

This methodological divergence, however, also arises from other causes and offers a window into the differing characters of generalist and specialized courts. Throughout this Article, I have referred to the Supreme Court's holistic *turn* to accentuate the Court's recent interventions in patent law. As I have indicated, however, the Supreme Court has favored holistic standards on several prominent occasions in its long history of patent adjudication.[427] In some ways, this preference reflects yet another strategy for avoiding (or, more precisely, delegating) information costs; rather than clearly defining, limiting, and guiding patent doctrine, the Supreme Court announces nebulous standards that impose high information-cost externalities on others.

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423. *Cf.* MedImmune, Inc. v. Genentech, Inc., 549 U.S. 118 (2007) (applying the same standards that govern declaratory actions in non-patent cases to patent cases).

424. *Festo VI*, 234 F.3d 558 (Fed. Cir. 2000) (en banc), *vacated*, 535 U.S. 722 (2002); Wagner, *supra* note 165, at 238 (noting that the Federal Circuit is uniquely well positioned to evaluate the effectiveness of patent doctrines).

425. Michel Letter, *supra* note 397.

426. As noted, while such formalistic doctrine may be easier to apply, it may lead to poor outcomes in terms of accuracy. *See supra* note 249 and accompanying text.

427. *See, e.g.*, Graham v. John Deere Co., 383 U.S. 1 (1966) (establishing a broad standard for evaluating nonobviousness); Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 609 (1950) (disavowing a formalistic approach to the doctrine of equivalents); Winans v. Denmead, 56 U.S. (15 How.) 330 (1854) (recognizing that the scope of a patentee's exclusive rights exceeds the patent's literal claims). I make no claim that the Supreme Court has categorically preferred holism throughout its engagements with patent law; it may very well be the case that the Court's methodological preferences have changed over time. I leave these questions for future inquiries.

However, holistic standards serve other, more laudable objectives that also reflect the Court's generalist outlook. For example, Supreme Court standards facilitate a purposive, policy-oriented approach to resolving patent disputes.[428] In contradistinction to Federal Circuit formalism, discretionary standards encourage judges to consider context and implications in deciding patent cases;[429] in some sense, this flexible approach better resonates with the instrumentalist character of the patent system.[430] Furthermore, Supreme Court standards also reflect an attempt to harmonize this specialized area of law with transcendent legal principles. This holistic, "big picture" approach reflects both the Supreme Court's generalist character as well as its position at the top of the judicial hierarchy.[431]

On the other hand, a quasi-specialized court such as the Federal Circuit takes a much narrower, more technical approach to its subject.[432] It is concerned less with big-picture coherence and more with everyday practicality; hence it emphasizes inquiry-truncating formalistic rules. Furthermore, such a specialized court is more likely to appreciate the singularity of its subject, thus trending toward doctrinal exceptionalism. The result is bright-line, specialized rules that limit judicial discretion and admit fewer contextual factors.

Of course, in applying the Two Cultures thesis to the Federal Circuit and the Supreme Court, one must acknowledge that this thesis is itself a simplifying heuristic that can obscure as well as illuminate. As Snow himself observed, "Attempts to divide anything into two ought to be regarded with much suspicion."[433] As noted earlier, there is substantial internal heterogeneity within both the Federal Circuit[434] and the Supreme Court;[435] neither court speaks with one voice.

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428. *See, e.g.*, *Festo VIII*, 535 U.S. 722, 737-38 (2002).

429. *Cf.* Bilski v. Kappos, 130 S. Ct. 3218, 3227 (2010) ("In the course of applying the machine-or-transformation test to emerging technologies, courts may pose questions of such intricacy and refinement that they risk obscuring the larger object of securing patents for valuable inventions without transgressing the public domain.").

430. *See* Rai, *supra* note 15, at 1040; *see also* U.S. CONST. art. I, § 8, cl. 8 (granting Congress the power "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries").

431. *See* Dreyfuss, *What the Federal Circuit Can Learn*, *supra* note 15, at 795 ("[The Federal Circuit] has little chance to see how patents fit into the economy as a whole. The Supreme Court does have that perspective.").

432. *Cf.* David A. Weisbach, *Formalism in the Tax Law*, 66 U. CHI. L. REV. 860, 860 (1999) (noting the traditionally formalistic nature of tax law, a highly technical field).

433. SNOW, *supra* note 7, at 9.

434. *See supra* note 155.

Furthermore, culture is fluid, and the dynamic described here is not static. In particular, there are signs that the Federal Circuit is responding in kind to the Supreme Court's holistic turn. For example, in *In re Kubin*, the Federal Circuit drew from the Supreme Court's decision in *KSR* to affirm that the status of a combination as being "obvious to try" may, in some cases, render it obvious.[436] In announcing its new rule, the Federal Circuit stated, "The Supreme Court's admonition against a formalistic approach to obviousness in this context actually resurrects this court's own wisdom [from earlier case law]."[437] The Federal Circuit has also responded in kind to the Supreme Court's program of narrowing the power conferred by patents. Recently, in several prominent cases, the court has scrutinized and reversed large damages awards arising from patent infringement.[438] Tellingly, these developments suggest a heightened role to be played by district judges in managing and reviewing damages calculations, thus increasing their cognitive demands.

More substantively, one sees some indication of a "holistic turn" in the Federal Circuit's approach to patentable subject matter. In *In re Bilski*,[439] the Federal Circuit overruled previous doctrine establishing an expansive, relatively bright-line approach to the patentability of processes.[440] Instead, the Federal Circuit announced the machine-or-transformation test to guide patent eligibility. While even the name of the machine-or-transformation test smacks of bright-line rules and formalism, the Federal Circuit's decision was arguably more holistic than earlier precedent that essentially equated patentable subject matter with utility.[441] Relative to that earlier precedent, *Bilski* demanded deeper, more holistic examinations of inventions.

As we have seen, however, the Supreme Court recently expressed disfavor with *Bilski*; in so doing, it has embraced an even more holistic approach to

435. *Compare* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 394-95 (2006) (Roberts, C.J., concurring) (emphasizing the historical practice of granting injunctions in most patent cases), *with id.* at 395-97 (Kennedy, J., concurring) (highlighting the emergence of new types of patents and patent practice for which injunctive relief may be inappropriate).

436. 561 F.3d 1351, 1359 (Fed. Cir. 2009).

437. *Id.*; *see* KSR *Ruling Guides Application of 'Obvious To Try' Test to Biotech Claim*, 77 U.S.L.W. 1634, 1634 (2009).

438. ResQNet.com, Inc. v. Lansa, Inc., 594 F.3d 860 (Fed. Cir. 2010); Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301 (Fed. Cir. 2009).

439. *In re* Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc).

440. 545 F.3d at 960-61; *see* AT&T Corp. v. Excel Commc'ns, Inc., 172 F.3d 1352 (Fed. Cir. 1999); State Street Bank & Trust Co. v. Signature Fin. Grp., Inc., 149 F.3d 1368 (Fed. Cir. 1998); *In re* Alappat, 33 F.3d 1526 (Fed. Cir. 1994).

441. *State Street*, 149 F.3d 1368.

patentable subject matter. In *Bilski v. Kappos*, the Court rejected the machine-or-transformation test as the exclusive test for the patentability of processes, relying instead on the more holistic "abstract idea" line of doctrine to deny the patentability of the invention at issue.[442] The day after the Court issued its opinion, it granted the petition for a writ of certiorari in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, vacated the judgment, and remanded to the Federal Circuit to further evaluate the case in light of the Court's new guidance in *Bilski*.[443] The Federal Circuit will now reconsider this important case addressing the patentability of a method for optimizing drug dosages, and it remains to be seen if it will respond in kind to the Supreme Court's holistic overtures. Although reflecting two divergent cultures, the Federal Circuit and the Supreme Court are locked in dialogue,[444] and cultural orientations may shift over time.

CONCLUSION

Patent law represents a fascinating intersection of two traditionally divergent cultures: law and science.[445] This Article has used the trope of the Two Cultures to examine the difficulties inherent in generalist judges adjudicating technologically complex patent cases. Judges express significant anxiety over their ability to understand new technologies, and empirical evidence confirms that these anxieties are well founded. The challenge of bridging the Two Cultures has elicited a number of policy responses, from selecting scientifically trained judges to establishing specialized courts. This Article, however, reveals the significant role of doctrine in mitigating the burdens of technologically intensive adjudication.

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442. Bilski v. Kappos, 130 S. Ct. 3218 (2010). Arguing before the Supreme Court, counsel for Bilski encouraged the Court to continue its inclination to overturn "rigid and narrow" tests created by the Federal Circuit. *See* Tony Dutra & Anandashankar Mazumdar, *Justices Hear Oral Argument on Patentability of Business Methods*, 78 U.S.L.W. 3282, 3282 (2009).

443. 130 S. Ct. 3543 (2010). *Mayo* also concerns the question of whether a claimed process—in this case, a method for optimizing the dosing of a drug—constitutes patentable subject matter. *Id.*

444. *See* Dreyfuss, *What the Federal Circuit Can Learn*, *supra* note 15, at 794 ("Sharing their views—learning from one another—could enhance the operation of the patent system, shed light on the costs and benefits of specialization, ease the path for other specialized courts, and improve judicial administration more generally."). The dialogue metaphor is a popular one for describing the relationship of these two courts. *See, e.g.*, Castanias et al., *supra* note 223; *Law Professor calls for 'Dialogue,'* *supra* note 367.

445. *See* Hultberg, *supra* note 11, at 197-98.

In pursuing this theme, this Article has explored the psychology of technological engagement. This literature reveals that technology can impose significant burdens on laypeople, who employ a variety of mechanisms to mitigate them. In particular, consistent with a "cognitive miser" model of information processing, nonexperts commonly adopt simplifying heuristics and defer to technical expertise when confronting unfamiliar technologies.

Drawing from these psychological principles, this Article has presented an information-cost theory of patent doctrine. It argues that the formalistic nature of Federal Circuit jurisprudence mitigates technological engagement by generalist judges. In particular, the inquiry-truncating nature of formalism limits the universe of technological facts that judges must consider in deciding patent issues.

However, the Supreme Court's recent forays into patent law push against this formalistic trend. While the Court's narrowing of substantive patent rights is indeed significant, this Article highlights the Court's underappreciated methodological shift. In a variety of doctrinal areas, the Supreme Court is consistently favoring holistic standards over bright-line, formalistic rules. This "holistic turn," while injecting valuable flexibility into patent adjudication, threatens to increase cognitive demands on generalist judges. From an economic perspective, Supreme Court patent standards impose information-cost externalities on lower court adjudicators. To help internalize these externalities, this Article seeks to apply enablement principles to Supreme Court patent decisions. By encouraging Supreme Court Justices to consider and illustrate myriad applications of new patent doctrine, an enablement orientation would help produce doctrine that is clearer and more accessible to persons of ordinary skill in legal arts.

This inquiry holds several broader implications. In a general sense, it argues for exploiting the psychology and sociology of science as scholarly resources for understanding and improving the patent system. Additionally, it sheds new light on formalism, which plays a surprising role in mediating the intersection of lay judges and technological subject matter. Finally, this Article has explored the institutional bases for the methodological divergence of the Federal Circuit and the Supreme Court. In substantial part, the Federal Circuit's preference for formalism relates to its specialized nature, while the Supreme Court's generalist outlook informs its preference for holistic standards. These seminal institutions have important and differing approaches to patent law, and the most fruitful engagements between law and technology may require blending aspects of both.