 Printed in U.S.A.
Vol. 108, No. 1

Articles

INFORMAL DEFERENCE: A HISTORICAL, EMPIRICAL, AND NORMATIVE ANALYSIS OF PATENT CLAIM CONSTRUCTION

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ABSTRACT—The Federal Circuit has been the target of a flurry of criticism regarding its claim construction jurisprudence. District judges, members of the bar, academics, and even the court's own judges have been highly critical of the court's rate of reversal of claim construction appeals, which peaked above 40%. Partially in response to the critics, the Federal Circuit undertook to reassess its claim construction jurisprudence in the *Phillips* case in 2005. The empirical and theoretical studies that have emerged since *Phillips* suggest that little has changed: the Federal Circuit's high reversal rate persists and the court's procedures remain unaltered.

This Article contradicts those perceptions based on a comprehensive empirical analysis of the Federal Circuit's claim construction jurisprudence from 2000 through 2011. We find that the reversal rate has dropped significantly since *Phillips*, dipping to 16.5% in 2009 from a high of 44% in 2004. Not only has the reversal rate plummeted, it has done so across the board: all judges on the Federal Circuit are now more likely to affirm claim construction decisions than they were previously, and nearly every technology sector case is more likely to be affirmed on appeal. *Phillips* signaled the beginning of an era of increasing yet "informal deference" to district court claim construction decisions.

The current era of informal deference does not mean, however, that the problems of claim construction have been adequately resolved. Notwithstanding the drop in the reversal rate, the Federal Circuit's adherence to the de novo standard has frustrated district courts' distinctive capabilities for apprehending and resolving the factual disputes inherent in claim construction determinations, undermined the transparency of the claim construction process, discouraged detailed and transparent explanations of claim construction reasoning, and produced alarming levels of appellate reversals. The Supreme Court's *Markman* decision supports a balanced, structurally sound, legally appropriate, hybrid standard of appellate review that would promote more accurate, efficient patent dispute resolution. Under this standard, the Federal Circuit would defer to trial judges' factual determinations in claim construction rulings—such as how a person having ordinary skill in the art would understand technical terms

used in a claim—but would retain de novo authority over whether the trial court's factual finding inappropriately overrides more specific intrinsic indications of the patent's scope.

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INTRODUCTION

Patent claim construction—the process of interpreting patent boundaries—is central to the operation of the patent system.[1] When patentees seek to enforce their rights in court, the interpretation of patent

[1] *See* Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?*, 15 HARV. J.L. & TECH. 1, 8 (2001) (observing that "[d]etermining the scope of the patent claims is the most important issue in a patent infringement suit"); Giles S. Rich, *Extent of Protection and Interpretation of Claims—American Perspectives*, 21 INT'L REV. INDUS. PROP. & COPYRIGHT L. 497, 499 (1990) ("[T]he name of the game is the claim." (emphasis omitted)); R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1119 (2004) (finding that "it is clear that claim construction plays a major—and perhaps *the* major—role in patent infringement litigation"); William Redin Woodward, *Definiteness and Particularity in Patent Claims*, 46 MICH. L. REV. 755, 757 (1948) (observing that "[i]n [the United States], the claims are regarded as definitions of the invention, rather than mere guides to its scope" and "are so all-important on the measure of the grant, they are the subject of energetic and often protracted contest between applicants and examiners in Patent Office proceedings").

claim boundaries guides both infringement and validity analysis.[2] As a result, patent prosecutors devote substantial effort to crafting patent claims that maximize scope while differentiating prior art.[3] Businesses seeking to enter the marketplace must be careful to avoid encroaching patent claims or risk liability for patent infringement.

Notwithstanding the critical importance of claim boundaries to both patentees and competitors, the processes and doctrines governing the construction of patent claims are notoriously amorphous and uncertain. The United States Patent and Trademark Office devotes relatively little effort to clarifying patent boundaries in the examination process.[4] Thus, when patentees seek to enforce their patents, the task of claim construction falls to generalist federal district court judges, few of whom have technical training or experience with patent law.[5]

Claim construction's importance to the patent system has led to a large body of literature critical of modern claim construction practice.[6] Much of

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[2] Peter S. Menell et al., *Patent Claim Construction: A Modern Synthesis and Structured Framework*, 25 BERKELEY TECH. L.J. 711, 714 (2010).

[3] *See* Woodward, *supra* note 1.

[4] *See* Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1500 n.19 (2001) (noting estimates that patent examiners devote less than twenty hours, on average, to reviewing patents).

[5] *See* The Honorable S. Jay Plager, *Abolish the Court of Federal Claims? A Question of Democratic Principle*, 71 GEO. WASH. L. REV. 791, 797 (2003) (observing that "[m]ost district court judges do not have scientific training, and most have not chosen law clerks with technical or patent backgrounds"); *cf.* Judge James F. Holderman in collaboration with Halley Guren, *The Patent Litigation Predicament in the United States*, 2007 U. ILL. J.L. TECH. & POL'Y 1, 5 (stating that most fellow district court judges do not share his enthusiasm for patent cases).

[6] *See, e.g.*, Gretchen Ann Bender, *Uncertainty and Unpredictability in Patent Litigation: The Time Is Ripe for a Consistent Claim Construction Methodology*, 8 J. INTELL. PROP. L. 175, 215–86 (2001) (criticizing the Federal Circuit's claim construction jurisprudence); Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1746–48 (2009) (suggesting that patent law look to central claiming to reduce the uncertainty in claim construction); Russell B. Hill & Frank P. Cote, *Ending the Federal Circuit Crapshoot: Emphasizing Plain Meaning in Patent Claim Interpretation*, 42 IDEA 1, 8–15 (2002) (proposing increased use of "plain meaning" in claim construction); Jay P. Kesan & Gwendolyn G. Ball, *How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes*, 84 WASH. U. L. REV. 237, 300 (2006) (noting the high cost of patent claim construction); Mark A. Lemley, *The Changing Meaning of Patent Claim Terms*, 104 MICH. L. REV. 101, 118–19 (2005) (arguing that patent claim terms should have a fixed meaning at the time of the patent application); Mark A. Lemley, *The Limits of Claim Differentiation*, 22 BERKELEY TECH. L.J. 1389, 1391–94 (2007) (arguing for limits on the doctrine of claim differentiation); Joseph Scott Miller, *Enhancing Patent Disclosure for Faithful Claim Construction*, 9 LEWIS & CLARK L. REV. 177, 199–210 (2005) (looking to the patent specification for claim construction guidance); Craig Allen Nard, *A Theory of Claim Interpretation*, 14 HARV. J.L. & TECH. 1, 4, 7–9 (2000) (criticizing the Federal Circuit's hypertextualist jurisprudence, generally); Kristen Osenga, *Linguistics and Patent Claim Construction*, 38 RUTGERS L.J. 61, 83–84 (2006) (proposing a linguistic-based approach to claim construction); Lee Petherbridge, *The Claim Construction Effect*, 15 MICH. TELECOMM. & TECH. L. REV. 215, 218–19 (2008) (describing the difficulty inherent in the claim construction process); David L. Schwartz, *Practice Makes Perfect? An*

the criticism originates from the high reversal rates of claim construction appeals—ranging from 35% to 44%.[7] One district court judge has observed that in view of such a high reversal rate, "you might as well throw darts."[8] Numerous scholars have argued that the source of uncertainty in claim construction is the Federal Circuit itself: the court's jurisprudence is difficult to understand and at times contradictory.[9] Even the Federal Circuit's landmark 2005 decision in *Phillips v. AWH Corp.*,[10] which many viewed as a potential watershed moment, did not appease the critics. According to the academic studies following *Phillips*, very little has changed—the high reversal rate persists and the Federal Circuit's claim construction methodology remains unclear.[11]

Empirical Study of Claim Construction Reversal Rates in Patent Cases, 107 MICH. L. REV. 223, 267 (2008) (finding that experience with claim construction does not improve district court reversal odds).

[7] *See* Christian A. Chu, *Empirical Analysis of the Federal Circuit's Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075, 1104 (2001) (reporting a 44% reversal rate); Kimberly A. Moore, Markman *Eight Years Later: Is Claim Construction More Predictable?*, 9 LEWIS & CLARK L. REV. 231, 233 (2005) (reporting a 34.5% reversal rate); Michael Saunders, *A Survey of Post*-Phillips *Claim Construction Cases*, 22 BERKELEY TECH. L.J. 215, 232–35 (2007); Andrew T. Zidel, *Patent Claim Construction in the Trial Courts: A Study Showing the Need for Clear Guidance from the Federal Circuit*, 33 SETON HALL L. REV. 711, 745–46 (2003) (reporting a 41.5% reversal rate). *But see* Jeffrey A. Lefstin, *Claim Construction, Appeal, and the Predictability of Interpretive Regimes*, 61 U. MIAMI L. REV. 1033, 1038–39 (2007) (arguing that the patent claim construction reversal rate is not substantially higher than reversal rates observed in other forms of complex litigation).

[8] *See* Anandashankar Mazumdar, *Federal District Courts Need Experts that Are Good 'Teachers,' Judges Tell Bar*, 70 PAT. TRADEMARK & COPYRIGHT J. (BNA) 536, 537 (Sept. 16, 2005) (quoting Judge Marsha J. Penchman of the U.S. District Court of Western Washington); *see also* Ultratech, Inc. v. Tamarack Scientific Co., No. C 03-03235 CRB, 2005 WL 2562623, at *7 (N.D. Cal. Oct. 12, 2005) ("Nor can the Court say that Ultratech's claim construction position is so frivolous as to warrant sanctions; to be candid, this Court is reluctant to hold that any claim construction is frivolous, given the well-known reversal rate in the Federal Circuit."); The Honorable Kathleen M. O'Malley et al., *A Panel Discussion: Claim Construction from the Perspective of the District Judge*, 54 CASE W. RES. L. REV. 671, 682 (2004) (noting that some district court judges are "demoralize[d]" by the high reversal rate) (remarks of Judge Patti Saris). The Federal Circuit has noted the concern. *See* Merck & Co. v. Teva Pharm. USA, Inc., 395 F.3d 1364, 1381 (Fed. Cir. 2005) (Rader J., dissenting) (noting that the Federal Circuit "often hears criticism from district court judges that its reversal rate on claim construction issues far exceeds that of other circuit courts").

[9] *See* Bender, *supra* note 6, at 211, 217; Burk & Lemley, *supra* note 6, at 1771; Hill & Cote, *supra* note 6, at 2; Timothy R. Holbrook, *Substantive Versus Process-Based Formalism in Claim Construction*, 9 LEWIS & CLARK L. REV. 123, 133–46 (2005); Miller, *supra* note 6, at 182; Kelly Casey Mullally, *Patent Hermeneutics: Form and Substance in Claim Construction*, 59 FLA. L. REV. 333, 334 (2007); Nard, *supra* note 6, at 82; Osenga, *supra* note 6, at 68–73; Wagner & Petherbridge, *supra* note 1.

[10] 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

[11] *See* Neil E. Graham, *Judges Debate Legacy of* Phillips*: Landmark Ruling or 'Nothing New'?*, 70 PAT. TRADEMARK & COPYRIGHT J. (BNA) 413, 413 (Aug. 5, 2005) (quoting Judge Susan Braden as characterizing the *Phillips* decision as "much ado about nothing"); Cheryl Lee Johnson, *The Continuing Inability of Judges to Pass Their* Markman *Tests: Why the Broken System Leaves Judges Behind, Confused and Demoralized*, *in MARKMAN* HEARINGS AND CLAIM CONSTRUCTION IN PATENT LITIGATION 2008, at 69, 108 (2008) (declaring that "[w]hat *Phillips* delivered was disappointment"); Saunders, *supra* note 7, at 239 (finding that post-*Phillips* "reversal rates remain substantially the same"

This Article calls this perception into question based on a comprehensive empirical analysis of the Federal Circuit's claim construction jurisprudence from 2000 through 2011. The data show that the claim construction reversal rate has dropped significantly since the *Phillips* decision: from 38.6% to 25.6% on a per-claim-term basis. The reversal rate on a per-case basis (i.e., percentage of cases with at least one reversed claim term) has fallen from 41.8% prior to *Phillips* to 31.6% following the decision. During 2009, the reversal rate dipped to 16.5%. The reversal rate for 2011 was 20.4%. Since *Phillips*, each Federal Circuit judge has become more likely to affirm claim construction appeals than he or she was before the decision. Furthermore, claim construction decisions are now more likely to be affirmed on appeal across nearly all technologies.

While the Federal Circuit continues to adhere to de novo standard of review for claim construction rulings,[12] our data indicate that *Phillips* triggered an era of "informal deference" on the court. *Phillips* signaled a softening of the Federal Circuit's approach to deference even though the court declined to repudiate the de novo standard expressly. The Federal Circuit has steadfastly held that it owes no deference to district court claim construction rulings,[13] notwithstanding indications in the Supreme Court's 1996 *Markman* decision that claim construction can entail factual determinations.[14] Many judges on the court take issue with that view.[15] The lack of consensus among judges on the Federal Circuit continues to produce uncertainty and confusion for the patent system. On March 15, 2013, the Federal Circuit granted a petition for en banc review on:

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and while *Phillips* has had "some effect on claim construction reasoning, [it] has not resolved the underlying disputes and problems with claim construction"); R. Polk Wagner & Lee Petherbridge, *Did* Phillips *Change Anything? Empirical Analysis of the Federal Circuit's Claim Construction Jurisprudence*, *in* INTELLECTUAL PROPERTY AND THE COMMON LAW (Shyamkrishna Balganesh ed., 2013) (finding that *Phillips* has done little to ameliorate the methodological disputes on the Federal Circuit and has "undermined . . . efforts to develop a coherent and predictable jurisprudence") (manuscript at 148) (on file with authors).

[12] *See* Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc).

[13] *See* Retractable Techs., Inc. v. Becton, Dickinson & Co., 659 F.3d 1369, 1373 (Fed. Cir. 2011) (Moore, J., joined by Rader, C.J., dissenting from denial of rehearing en banc), *cert. denied*, 133 S. Ct. 833 (2013); Trading Techs. Int'l, Inc. v. eSpeed, Inc., 595 F.3d 1340, 1350–51 (Fed. Cir. 2010); *id.* at 1363–64 (Clark, District Judge (E.D. Tex.), concurring); Medegen MMS, Inc. v. ICU Med., Inc., 317 F. App'x 982, 988–91 (Fed. Cir. 2008) (Walker, Chief District Judge (N.D. Cal.), dissenting) (urging greater deference); Amgen Inc. v. Hoechst Marion Roussel, Inc., 469 F.3d 1039, 1040 (Fed. Cir. 2006) (Michel, C.J., joined by Rader, J., dissenting from denial of rehearing en banc).

[14] *See* Markman v. Westview Instruments, 517 U.S. 370, 378, 388, 390 (1996) (noting that "construing a term of art following receipt of evidence" is "a mongrel practice"; claim construction "falls somewhere between a pristine legal standard and a simple historical fact"; and "there is sufficient reason to treat construction of terms of art like many other responsibilities that we cede to a judge in the normal course of trial, notwithstanding its evidentiary underpinnings").

[15] *See, e.g.*, *Retractable Techs.*, 659 F.3d at 1373 (Moore, J., joined by Rader, C.J., dissenting from denial of rehearing en banc); *id.* (O'Malley, J., dissenting from denial of rehearing en banc); *Amgen*, 469 F.3d at 1040 (Michel, C.J., joined by Rader, J., dissenting from denial of rehearing en banc).

(1) whether it should overrule *Cybor Corp. v. FAS Technologies, Inc.*, (2) whether it should "afford deference to any aspect of a district court's claim construction," and (3) "[i]f so, which aspects should be afforded deference."[16]

Our Article provides a way forward for a court torn between a formal de novo standard of review and a pragmatic, informal, and deferential standard. The Supreme Court's *Markman* decision supports a balanced, structurally sound, legally appropriate, hybrid standard of appellate review that would promote more accurate, efficient patent dispute resolution. Under this standard, the Federal Circuit would defer to trial judges' factual determinations in claim construction rulings—such as how a person having ordinary skill in the art would understand technical terms used in a claim—but would retain de novo authority over whether the trial court's factual finding inappropriately overrides more specific intrinsic indications of the patent's scope.

The hybrid standard of appellate review of claim construction rulings appropriately leverages trial judges' special ability to develop the evidentiary record needed to resolve the mixed fact and law controversies inherent in patent claim construction while enhancing the quality of appellate review. According greater deference to trial courts through clear error review of the factual underpinnings of claim construction rulings that are supported by sound evidentiary processes, properly documented records, and transparent reasoning would promote more systematic, well-founded claim construction analysis. Combining this deferential review of factual findings with de novo review of the overarching claim construction determination would provide the appropriate appellate safeguard.

We set the stage for our analysis in Part I by tracing the evolution of patent claim construction jurisprudence from the enactment of patent protection shortly after the founding of the United States to the present. Part II describes our empirical methodology and reports key findings with regard to reversal rates, evidentiary sources, doctrinal patterns, judge-specific patterns, technology patterns, and procedural patterns. Part III evaluates potential explanations for our empirical results. Part IV provides a normative analysis of the standard of review for claim construction rulings. Drawing on the historical and empirical analyses, it contends that although the shift toward informal deference has been salutary, formal recognition of a more deferential standard would produce a richer factual record for claim construction determinations, better grounded decisions, and more transparent rulings while encouraging earlier settlement of cases.

[16] *See* Lighting Ballast Control LLC v. Philips Elecs. N. Am. Corp., 500 F. App'x 951, 951–52 (Fed. Cir. 2013) (per curiam).

I. THE EVOLUTION OF PATENT CLAIM CONSTRUCTION

Since the Supreme Court's 1996 *Markman* decision, claim construction has taken on a central role in patent case management as a distinct procedural stage, a tool for facilitating summary judgment, and a foundation for expert reports.[17] To more fully appreciate the modern claim construction era and as background for our normative analysis, this Part traces the evolution of patent claim construction.

The formal process of a judge construing patent claims is of relatively recent vintage and reflects the confluence of four principal factors: (1) the emergence of patent claiming in the early nineteenth century, (2) the shift from central claiming to peripheral claiming in the mid- to late nineteenth century, (3) the shift in infringement jurisprudence toward a focus on claim boundaries beginning in the late nineteenth century, and (4) the resurgence of patent jury trials in the 1970s after more than a century of disuse.

A. Early History

1. 1790–1836: The "Invention" and Emergence of Patent Claims.—The development of claim construction logically begins with the emergence of patent claiming. As Karl Lutz explained, "nothing in the nature of a claim had appeared either in British patent practice or in that of the American states" prior to 1790.[18] At its inception in 1790, the U.S. patent system required:

> a specification in writing, containing a description, accompanied with drafts or models, and explanations and models (if the nature of the invention or discovery will admit of a model) of the thing or things, by him or them invented or discovered, and described as aforesaid, in the said patents.[19]

There was no requirement that the inventor specifically *claim* the invention, and most early patents did not contain formal claims.[20] Rather, applicants focused on describing the invention.[21]

The 1790 Patent Act was short-lived for several reasons. It tasked the Secretary of State (Thomas Jefferson), the Secretary for the Department of War, and the Attorney General with personally examining patents, which,

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[17] *See* PETER S. MENELL ET AL., PATENT CASE MANAGEMENT JUDICIAL GUIDE ch. 5 (2d ed. 2012).

[18] *See* Karl B. Lutz, *Evolution of the Claims of U.S. Patents*, 20 J. PAT. OFF. SOC'Y 134, 134 (1938).

[19] *See* Patent Act of 1790, ch. 7, § 2, 1 Stat. 109, 110.

[20] *See* Lutz, *supra* note 18, at 134–35; Woodward, *supra* note 1, at 758.

[21] *See* ch. 7, § 2, 1 Stat. at 110 (requiring applicants to "distinguish the invention or discovery from other things before known"); Patent Act of 1793, ch. 11, § 3, 1 Stat. 318, 321 (requiring applicants to "distinguish the same from all other things before known").

in light of their other responsibilities, proved untenable.[22] Second, inventors were displeased with the high and vague threshold for protection: that inventions be deemed "sufficiently useful and important."[23]

As a result, in 1793 Congress struck the requirement that inventions be "sufficiently useful and important" and replaced the examination process with a registration system,[24] leaving the evaluation of patentability entirely to the courts. The Patent Act of 1793 retained a terse standard for patentability: an inventor could patent "any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement on any art, machine, manufacture or composition of matter, not known or used before the application."[25] The inventor was still required to provide a written description of the invention and the manner of use

> in such full, clear and exact terms, as to distinguish the same from all other things before known, and to enable any person skilled in the art or science, of which it is a branch, or with which it is most nearly connected, to make, compound, and use the same.[26]

Following this directive and usages growing out of the English statute and practice on which the U.S. patent system was based, the first American patents merely described the invention in general terms. According to Lutz, the "earliest suggestion of the claim . . . was the inclusion in the description of a statement that the patentee did not intend to be limited to the specific disclosure of the patent."[27] Such negative limitations would come to be disfavored in Patent Office guidance.[28]

Woodward credits Robert Fulton, developer of the first commercially successful steamboat, with "inventing" the patent claim.[29] His 1811 patent stated:

> Having been the first to demonstrate the superior advantages of a water wheel or wheels, *I claim* as my exclusive right, the use of two wheels, one over each side of the boat to take the purchase on the water . . . .[30]

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[22] *See* P.J. Federico, *Operation of the Patent Act of 1790*, 18 J. PAT. OFF. SOC'Y 237, 238, 251 (1936); Letter from Thomas Jefferson to Hugh Williamson (Apr. 1, 1792), *reprinted in* 6 THE WORKS OF THOMAS JEFFERSON 458, 459 (Paul Leicester Ford ed., fed. ed. 1904).

[23] Steven Lubar, *The Transformation of Antebellum Patent Law*, 32 TECH. & CULTURE (SPECIAL ISSUE) 932, 935–36 (1991) (quoting Patent Act of 1790, ch. 7 § 1, 1 Stat. 109, 100).

[24] Patent Act of 1793, ch. 11, 1 Stat. 318.

[25] *See id.* § 1, 1 Stat. at 319.

[26] *See id.* § 3, 1 Stat. at 321.

[27] Lutz, *supra* note 18, at 135 (citing a 1799 patent).

[28] *See id.* at 136.

[29] *See* Woodward, *supra* note 1, at 758 (describing Fulton's patent granted on February 9, 1811); *accord* Lutz, *supra* note 18, at 137 (commenting that "Fulton can perhaps more properly be credited with invention of the 'claim' than of the steamboat").

[30] *See* Lutz, *supra* note 18, at 136–37 (emphasis added).

Although there were sporadic examples in the first two decades of the nineteenth century of patents expressly claiming inventions, such explicit claiming was not the general practice.[31]

Justice Joseph Story, who would emerge as the leading patent jurist of the first half of the nineteenth century,[32] immediately came to see the problems with vague and conclusory descriptions of inventions. Sitting in his first patent case (and the first case to focus on the question of distinguishing a patented invention from the prior art[33]), he noted the "intrinsic difficulty . . . to ascertain . . . the exact boundaries between what was known and used before, and what is new."[34] Justice Story charged the jury that if the plaintiff did not invent "the whole machine" and only contributed "an improvement," the plaintiff's patent must be deemed "too broad" and "utterly void" because it was "clearly a patent for the whole machine."[35] Justice Story explicated this principle more fully four years later, charging the jury that:

> A patent is grantable only for a new and useful invention; and, unless it be distinctly stated, in what that invention specifically consists, it is impossible to say, whether it ought to be patented or not; and it is equally difficult to know, whether the public infringe upon or violate the exclusive right secured by the patent.[36]

The early judicial focus on patent clarity was directed to the question of patent validity—whether the specification adequately described the invention "in such full, clear and exact terms, as to distinguish the same from all other things before known"[37]—as opposed to patent infringement.[38] In 1822, the Supreme Court in *Evans v. Eaton* upheld the trial court's decision invalidating Evans's patent for failure to distinguish his improvement from the prior art:

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[31] *See id.* at 138.

[32] *See* Peter S. Menell, *The Mixed Heritage of Federal Intellectual Property Law and Ramifications for Statutory Interpretation*, *in* INTELLECTUAL PROPERTY AND THE COMMON LAW, *supra* note 11, at 72–73 & n.65; Frank D. Prager, *The Influence of Mr. Justice Story on American Patent Law*, 5 AM. J. LEG. HIST. 254 (1961).

[33] *See* Lutz, *supra* note 18, at 138.

[34] *See* Whittemore v. Cutter, 29 F. Cas. 1123, 1124 (C.C.D. Mass. 1813) (No. 17,601); *see also* Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432) (noting the "intrinsic difficulty").

[35] *See Whittemore*, 29 F. Cas. at 1123.

[36] *See* Lowell v. Lewis, 15 F. Cas. 1018, 1020 (C.C.D. Mass. 1817) (No. 8568).

[37] *See* Patent Act of 1793, ch. 11, § 3, 1 Stat. 318, 321.

[38] *See* Woodward, *supra* note 1, at 760 (explaining that "the courts for a long time did not regard the particular formulations chosen by the inventor to express his claim and distinguish his invention from the prior art as the definitive measure of the scope of the patent").

> We do not say that the party is bound to describe the old machine; but we are of opinion that he ought to describe what his own improvement is, and to limit his patent to such improvement.[39]

Consequently, patent drafters began to include formal patent claims at the end of their applications for the purpose of avoiding invalidation on the ground of defective specification.[40] In 1828, Dr. Thomas P. Jones, the Superintendent of the Patent Office, published an article entitled "Information to Persons Applying for Patents, or Transacting Other Business at the Patent Office," instructing applicants that:

> *No more must be claimed in the patent, than what is new, and is the invention, or discovery, of the patentee.*
>
> Many patents have been vacated, in consequence of inattention to this last rule. In the specification it is perfectly proper to describe an entire machine, although most parts of it may have been long known and used, as, otherwise, it may be difficult to make known the improvements; but after doing this, the patentee should distinctly set forth what he claims as new; and this is best done in a separate paragraph, at the end of the specification . . . .[41]

Thus, by the late 1820s, it had become common practice for patent applicants to include a formal designation of the claimed invention in a separate paragraph at the end of the specification.[42]

2. 1836–1870: The Rise and Fall of Central Claiming, the Shift to Bench Trials, and the Emergence of Peripheral Claims as the Measure of Patent Scope.—The lack of an examination system eroded faith in the patent system due to the proliferation of "unrestrained and promiscuous grants of patent privileges."[43] In response, the Patent Act of 1836 reinstituted examination in a newly constituted Patent Office and encouraged claiming conventions that grew out of jurisprudence[44] by requiring applicants to "particularly *specify and point out* the part,

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[39] 20 U.S. (7 Wheat.) 356, 435 (1822); *see also* Isaacs v. Cooper, 13 F. Cas. 153, 154 (C.C.D Pa. 1821) (No. 7096) (denying relief on the ground that "the nature of the improvement is altogether unintelligible").

[40] *See* N.J. Brumbaugh, *History and Purpose of Claims in United States Patent Law*, 14 J. PAT. OFF. SOC'Y 273, 276–77 (1932); Lutz, *supra* note 18, at 139–40.

[41] *See* Thomas P. Jones, *Information to Persons Applying for Patents, or Transacting Other Business at the Patent Office*, 6 FRANKLIN J. & AM. MECHANICS' MAG. 332, 334 (1828).

[42] *See* Brumbaugh, *supra* note 40, at 276 (observing that patent practitioners had "almost universally" been claiming their inventions in the years leading up to the 1836 Act).

[43] *See* JOHN RUGGLES, REPORT OF THE SELECT COMMITTEE APPOINTED TO TAKE INTO CONSIDERATION THE STATE AND CONDITION OF THE PATENT OFFICE, S. DOC. NO. 24-338, at 4 (1836).

[44] *See* Brumbaugh, *supra* note 40, at 276 (commenting that the 1836 Act "merely endorsed and positively required what inventors had been doing voluntarily for years").

improvement, or combination, which he claims as his own invention or discovery."[45]

The form of patent claiming that emerged during this period—which has come to be known as "central" claiming—differs substantially from the "peripheral" format in common usage today. Furthermore, the prevalence of patent jury trials increased substantially during the mid-nineteenth century. The early claiming format responded to the invalidation of overbroad claiming identified in such cases as *Whittemore v. Cutter* and *Evans v. Eaton* by using "reference characters"—alpha-numeric labels for patent drawings—to specify particular structural components illustrating their improvement.[46] The Patent Office's Rules of Practice as late as 1869 recommended use of reference characters in patent claims.[47]

Aside from the format in which claims were written, claims from this era differed from modern practice in their application and importance at trial. Claims were not used during this era as the basis for assessing patent infringement. The early infringement standard measured the accused device against the entirety of the patent, sometimes with reference to the patentee's actual device, using a substantial identity test.[48] The courts only gradually and episodically came to see the importance of claim boundaries in evaluating patent infringement.[49]

Thus, even though most patent cases were tried to juries through the mid-nineteenth century, claim construction was relatively limited and largely fell outside of the jury's role.[50] Infringement focused on the operative principle of the invention as set forth in the specification and the patentee's device. As Lutz described:

> As time went on complete control of the interpretation of patent documents was gradually transferred to the judge. When it became apparent that the jury was not equal to the task, the custom developed of having the judge include in his charge to the jury a detailed interpretation of the patent coupled with

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[45] *See* Patent Act of 1836, ch. 357, § 6, 5 Stat. 117, 119 (emphasis added); *see also* Lutz, *supra* note 18, at 143 ("This addition to the statute had no immediate effect on the form or substance of claims because it was understood as merely codifying the existing law which had been developed by the courts.").

[46] *See* RIDSDALE ELLIS, PATENT CLAIMS §§ 3–5 (1949).

[47] *See id.* § 5.

[48] *See* Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432) (Story, J.) (instructing the jury to determine infringement based on substantiality); GEORGE TICKNOR CURTIS, A TREATISE ON THE LAW OF PATENTS FOR USEFUL INVENTIONS IN THE UNITED STATES OF AMERICA § 220, at 262 (Boston, Charles C. Little & James Brown 1849) ("An infringement involves substantial identity, whether that identity is described by the terms, 'same principle,' same *modus operandi*, or any other."); Woodward, *supra* note 1, at 760.

[49] *See* Wyeth v. Stone 30 F. Cas. 723, 727–28 (C.C.D. Mass. 1840) (No. 18,107) (Story, J.); Lutz, *supra* note 18, at 145; Woodward, *supra* note 1, at 760–65.

[50] *See* Lutz, *supra* note 18, at 143 (observing that "[f]or approximately the first twenty years [following 1836] all infringement cases continued to be tried at law before a jury").

> instructions that his interpretation was binding on the jury. Another contributing influence was the increasing reliance of the patentees on the growing equity power of the courts, a practice which necessitated interpreting the patent on applications for injunctions, and which finally gave the judge complete equity jurisdiction of infringement cases.[51]

Thus, claim construction was relatively limited and largely outside of the jury's purview during this era.

Even before the 1836 Act, some applicants began using a more radical claiming format that would come to be known as "peripheral" claiming.[52] These claims used linguistic formulations, rather than references to specific improvements, to delineate the metes and bounds of the claimed invention.

3. 1870–1970: The Rise of Peripheral Claiming, Shift in the Role of Claims in Infringement Analysis, and Decline of Patent Jury Trials.—The Patent Act of 1870 formalized use of patent claims by requiring applicants to "particularly point out and distinctly *claim* the part, improvement, or combination which he claims as his invention or discovery."[53] Claims were already in universal use by that time. Of greater importance is the dramatic shift from central to peripheral claiming. As illustrated in Table 1, that transformation was almost entirely complete by the turn of the twentieth century, laying the foundation for the system of peripheral claiming and the multiplicity of claims per patent that predominates today.

TABLE 1: EVOLUTION OF CLAIM PRACTICE[54]

Year of Issue of Patents	Percentage of Claims Having Reference Characters	Average Number of Claims
1860	73%*	1.3
1880	82%*	3.3
1900	22%	7.7
1920	0%	7.2
1940	0%	6.9
*Many of the claims not having reference characters were process claims.		

Several institutions and factors contributed to this dramatic transformation in the nature of patent claiming. Although some commentators cite the passage of the 1870 Act as the major precipitating

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[51] *See id.*

[52] *See, e.g.*, Washburn v. Gould, 29 F. Cas. 312, 313–14, (C.C.D. Mass. 1844) (No. 17,214) (quoting from a patent for "a new and useful improvement in the method of planing, tonguing, grooving, and cutting into mouldings" registered in 1828); R. CARL MOY, 1 MOY'S WALKER ON PATENTS § 4:2, at 4-18 to -20 (4th ed. 2006).

[53] *See* Patent Act of 1870, ch. 230, § 26, 16 Stat. 198, 201 (emphasis added).

[54] *See* ELLIS, *supra* note 46, § 6.

factor,[55] the Patent Office had already begun the push toward peripheral claiming well before that date. As Lutz describes,[56] the Patent Office issued a series of pamphlets—including "Guide to Practice of the Patent Office" in 1852 and "Rules and Directions for Proceedings in the Patent Office" in 1862 and 1863—refining claiming practice and advocating greater specificity.[57] Under the leadership of Commissioner Samuel Sparks Fisher, the Patent Office began publishing the Commissioner's decisions in January 1869.[58] Building on this effort, the Patent Office would begin publishing the Official Gazette, a weekly journal, in 1872.[59] Brumbaugh explains that "[t]hese decisions . . . show[] the beginning of the present practice of the office with reference to the positive inclusion of elements in a claim."[60]

It is evident from these first published decisions that the Patent Office sought more detailed and clear articulation of patent claims. In *Ex parte Rubens*, Commissioner Fisher expressed:

> The claim should state all the elements of the combination intended to be patented, and if the parts are the same in name and number as in some prior machine, and the improvement consists in some modification of one or more of those parts, the claim should distinctly state that modification.[61]

Other decisions from this transformative period upheld claims lacking reference characters,[62] permitted "genus claiming,"[63] and signaled receptivity to multiple claims in stating that "claims in different forms . . . prevent misconstructions."[64]

The courts also played a critical role in the shift toward peripheral claiming, although the dramatic change of judicial course followed rather

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[55] *See, e.g.*, Nard, *supra* note 6, at 13 n.50; Joseph S. Cianfrani, *An Economic Analysis of the Doctrine of Equivalents*, 1 VA. J.L. & TECH. 1, ¶ 13 (1997), *available at* http://www.vjolt.net/vol1/issue/vol1_art1.pdf.

[56] *See* Karl B. Lutz, *Evolution of the Claims of U.S. Patents*, 20 J. PAT. OFF. SOC'Y 457 (1938).

[57] *Id.* at 464–66, 487–88.

[58] *See* William Edgar Simonds, *Preface* to A DIGEST OF PATENT OFFICE DECISIONS, 1869–1879, at v (William Edgar Simonds ed., Washington, D.C., W.H. & O.H. Morrison 1880); *Biographical Sketches of the Commissioners of Patents*, 18 J. PAT. OFF. SOC'Y (CENTENNIAL NUMBER) 145, 174 (1936) ("[Col. Fisher's] decisions were so illuminating, logical and concise as to necessarily compel attention.").

[59] *See Legislative Changes Since 1836*, 18 J. PAT. OFF. SOC'Y (CENTENNIAL NUMBER) 103, 115 (1936).

[60] *See* Brumbaugh, *supra* note 40, at 283; *see also* Woodward, *supra* note 1, at 764 (reporting that "[w]hen in 1866 a program was adopted for printing all specifications, including those of patents issued since 1836, the plan provided for putting the separate clauses of the claiming part into separate numbered paragraphs, to conform with the practice that had in the meanwhile become general").

[61] *See Ex parte* Charles Rubens & Co., 1869 Dec. Comm'r Pat. 107, 108.

[62] *See Ex parte* Continental Windmill Co., 1870 Dec. Comm'r Pat. 74, 75.

[63] *See Ex parte* Eagle, 1870 Dec. Comm'r Pat. 137, 137.

[64] *See Ex parte* Perry & Lay, 1869 Dec. Comm'r Pat. 1, 1.

than led the Patent Office's efforts. During the period when central claiming predominated, courts did not view claim language as a restriction on a patent's scope.[65] Rather, courts used claims as well as the specification to ascertain the patent's underlying inventive principle, which provided the baseline for evaluating whether the defendant's device embodied this principle, either identically or in a substantially equivalent manner.[66]

This approach to determining infringement reached its apogee in the Supreme Court's 1853 decision in *Winans v. Denmead*,[67] which applied this doctrine of equivalents. Writing for a narrow majority of the Court, Justice Benjamin Curtis reversed the trial judge on the ground that the defendants' rail cars were "substantially the same" "structure," "mode of operation," and "result."[68] The court focused not on the wording of the claim, but rather on what it considered to be the substance of the invention: the "new mode of operation."[69] The majority pointedly downplayed the role of claim language in restricting patent scope.[70]

Justice Campbell, joined by three other members of the Court, dissented in an opinion emphasizing the need for patents to provide clear notice of their boundaries to the public.[71] "Fulness, clearness, exactness, preciseness, and particularity, in the description of the invention, its principle, and of the matter claimed to be invented, will alone fulfil the demands of Congress or the wants of the country" in promoting competition and innovation.[72] In the dissent's view, the "language of the patent is full, clear, and exact. The claim is particular and specific. Neither the specification nor the claim . . . embrace the workmanship of the defendants."[73]

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[65] *See* Lutz, *supra* note 18, at 147 (explaining that "claims rarely, if ever, received consideration on the question of infringement" prior to 1870); *but cf.* Woodward, *supra* note 1, at 760 (noting that as early as 1831, a few courts "expressed that the claims of a patent might bind the patentee against assertion of a broader scope for the patent on the question of infringement").

[66] *See, e.g.*, Wyeth v. Stone, 30 F. Cas. 723, 728 (C.C.D. Mass. 1840) (No. 18,107) (Story, J.) (instructing jury that patentee is not "bound down to any precise form of words"); Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432) (Story, J.) (stating in charging the jury that "[t]he material question, therefore, is not whether the same elements of motion, or the same component parts are used, but whether the given effect is produced substantially by the same mode of operation, and the same combination of powers, in both machines"); CURTIS, *supra* note 48 (explaining the principle of "substantial identity" in patent infringement cases).

[67] 56 U.S. (15 How.) 330 (1853).

[68] *Id.* at 338–41.

[69] *Id.* at 341.

[70] *See id.* at 343 (holding that a patent extends beyond the words of the claim to "every form in which his invention may be copied").

[71] *See id.* at 347 (Campbell, J., dissenting).

[72] *Id.*

[73] *Id.* at 347–48.

The Campbell dissent's view ultimately prevailed. In two 1877 Supreme Court decisions—*Merrill v. Yeomans*[74] and *Keystone Bridge Co. v. Phoenix Iron Co.*[75]—the Supreme Court embraced patent law's public notice function by linking the scope of patent protection to the metes and bounds set forth in patent claims. This contributed to the decline of central claiming[76] and eventually made claim construction an essential step in infringement analysis. In a watershed passage in *Merrill*, the Court explained the critical role of clearly identifiable patent boundaries for technological and economic advance:

> The genius of the inventor, constantly making improvements in existing patents—a process which gives to the patent system its greatest value,—should not be restrained by vague and indefinite descriptions of claims in existing patents from the salutary and necessary right of improving on that which has already been invented. It seems to us that nothing can be more just and fair, both to the patentee and to the public, than that the former should understand, and correctly describe, just what he has invented, and for what he claims a patent.[77]

The patent claim quickly emerged as the defining feature of the patent.[78] In his seminal 1890 treatise, William C. Robinson characterized it as "the office of the Claim to define the limits of that exclusive use which is secured to the inventor by the patent";[79] "[t]he Claim is thus the life of the patent so far as the rights of the inventor are concerned."[80] This shift brought claim construction to a prominent role in patent litigation. As Robinson explained, "The paramount importance of the Claim, and the necessity for such exactness and completeness in its statements as will precisely define the invention to be protected by the patent, have led to the establishment of numerous rules for framing it."[81]

Regarding the allocation of responsibility for construing patent claims, Robinson recognized that "[t]he duty of interpreting letters-patent has been

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[74] 94 U.S. 568, 573–74 (1876).

[75] 95 U.S. 274, 278 (1877).

[76] *See* Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1142–45 (2008) (Lefstin cites *Merrill* as establishing the foundation for "[a]n ordered and logical system of patent law" based on "an ordered and logical system for defining patent rights. The system of peripheral claiming, in which the claims set forth the boundaries of the patent, served both ends.").

[77] *See Merrill*, 94 U.S. at 573–74.

[78] *See* Burns v. Meyer, 100 U.S. 671, 672 (1879) ("The courts, therefore, should be careful not to enlarge, by construction, the claim which the Patent Office has admitted, and which the patentee has acquiesced in, beyond the fair interpretation of its terms.").

[79] *See* 2 WILLIAM C. ROBINSON, THE LAW OF PATENTS FOR USEFUL INVENTIONS § 504, at 110 (Boston, Little, Brown & Co. 1890).

[80] *See id.* § 505, at 111.

[81] *See id.* § 507, at 115.

committed to the courts."[82] He cited the 1845 case of *Emerson v. Hogg*,[83] where the court found error in delegating a question of construction to the jury.[84] Robinson based this allocation of responsibility on the principle that the courts have primacy in interpreting legal instruments.[85] Following the court in *Emerson v. Hogg* and other authority,[86] Robinson characterized patent interpretation as a "question[] of law."[87] He justified this treatment on the functional consideration that:

> To treat the nature of the patented invention as a matter of fact, to be inquired of and determined by a jury, would at once deprive the inventor of the opportunity to obtain a permanent and universal definition of his rights under the patent, and in each case of infringement it would subject him to the danger of a false interpretation, from the consequences of which he could not escape. By confiding this duty to the court, however, its decision as to the nature of the patented invention becomes reviewable to the same extent as any other legal question, and when his patent has received the interpretation of the Supreme Court of the United States the inventor can maintain his privilege, as thus interpreted, against all opponents without further controversy in reference to its true limitations.[88]

Notwithstanding the characterization of claim construction as a "question of law," Robinson nonetheless recognized that:

> In its interpretation of a patent the court may have recourse to any testimony to explain the meaning of its language, or to expert evidence to ascertain the essential characteristics of the described invention and the differences between it and other patented inventions, or to papers in the Patent Office which are connected with the patent or whose contents were known to the inventor at the date of his application, to show the significance which he attached to the terms that he employed. But of whatever aid the courts avail themselves, their interpretation must be based upon the patent as it stands, and when its scope is

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[82] *See id.* § 732, at 481.

[83] 8 F. Cas. 628 (C.C.S.D.N.Y. 1845) (No. 4440), *aff'd*, 47 U.S. (6 How.) 437 (1848).

[84] *See id.* at 631 ("It is the province and the duty of the court to settle the meaning of the patent . . . .").

[85] *See* ROBINSON, *supra* note 79, § 732, at 481; *see also id.* § 733, at 483 n.1 ("There is great reason and importance for this distribution of the respective duties of the court and the jury. The import of the instrument is purely a question of law. The interpretation of complicated instruments of writing is a special occupation, requiring, like all others, special training and practice. The judge, from his training and discipline, is more likely to give a proper interpretation to such instruments than a jury . . . . The action of a judge, in such a case as that of interpreting the specification, is moreover open to review and correction, by reconsideration on his part, or by the revisal of a superior or appellate court . . . ." (quoting Parker v. Hulme, 18 F. Cas. 1138, 1140 (C.C.E.D. Pa. 1849) (No. 10,740))).

[86] 8 F. Cas. at 631; Nat'l Car-Brake Shoe Co. v. Terre Haute Car & Mfg. Co., 19 F. 514 (C.C.D. Ind. 1884).

[87] *See* ROBINSON, *supra* note 79, § 732, at 482.

[88] *See id.* § 733, at 483–84.

> once fairly apparent it can neither be limited nor extended by extraneous evidence.[89]

Thus, the nature of claim construction had a distinctive character, which the Supreme Court would later describe as a "mongrel" practice—a legal question based on underlying factual determinations reserved, notwithstanding the Seventh Amendment, to the trial judge.[90]

Although *Merrill* and *Keystone Bridge Co.* contributed to the centrality of claim restrictions in defining a patent's scope, claim drafting and claim construction continued to evolve over the next century.[91] It was quite common for courts to integrate their judgment about an inventor's contribution to the art into their evaluation of a patent's scope.[92] Judge Learned Hand would later remark: "No doubt the interpretation of patent claims depends more upon the advance made by the inventor than upon the words used, and in spite of protestations to the contrary, courts do at times play fast and loose with them as they do not with other formal documents."[93] Writing sixty years after the Supreme Court's *Merrill* decision, Lutz would state that "[t]he controversy as to whether the claim should be taken as a literal 'definition' of the invention persists to this day."[94]

4. 1970–1995: The Resurgence of Patent Jury Trials.—By the 1970s, the shift toward construing patent scope based on claim restrictions reached full fruition.[95] Largely coincidental with the ascendancy of the patent claim as a touchstone for determining patent scope, claim construction became subsumed in judicial deliberations as a result of the shift away from patent jury trials. The 1870 Act granted equity courts the power to award common law damages in patent cases,[96] prompting litigants to favor bench trials.[97] By 1940, the first year in which statistics on the

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[89] *See* 3 ROBINSON, *supra* note 79, § 1019, at 248 (footnote omitted).

[90] *See infra* Part I.B.1.

[91] *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, 348–62 (2008).

[92] *See* Eibel Process Co. v. Minn. & Ontario Paper Co., 261 U.S. 45, 63 (1923) (stating that the apparent conflict between strictly construing patent claims and finding equivalents could be explained by courts' "differing attitude . . . toward genuine discoveries and slight improvements").

[93] Cole v. Malleable Iron Fittings Co., 70 F.2d 686, 687 (2d Cir. 1934); *see also* Gen. Motors Corp. v. Kesling, 164 F.2d 824, 830 (8th Cir. 1947) ("Broad as is the language of these Claims, their scope depends upon the discovery revealed in the explanatory Specifications.").

[94] *See* Lutz, *supra* note 56, at 474.

[95] *See* Paeco, Inc. v. Applied Moldings, Inc., 562 F.2d 870, 874 (3d Cir. 1977) ("Where the language of a patent claim is clear, the court need not—and may not —go beyond the claim to the specification."); Maclaren v. B-I-W Grp. Inc., 535 F.2d 1367, 1372 (2d Cir. 1976) (declaring the claim's role in defining patent scope as "fundamental"); Golden, *supra* note 91, at 360–61.

[96] *See* Patent Act of 1870, ch. 230, § 55, 16 Stat. 198, 206.

[97] *See* Lutz, *supra* note 56, at 470 ("After 1870 patentees resorted to actions at law with decreasing frequency until finally the jurisdiction of equity over infringement suits became for all practical

percentage of jury trials by subject matter were compiled by the Administrative Office of the United States Courts, only 2.5% of patent trials were heard by juries.[98] The percentage of patent jury trials remained low—just a few per year—and never exceeded 10% until the mid-1970s.[99]

As reflected in Figure 1, patent jury trials grew steadily beginning in the mid-1970s.[100] The reasons for preferring trial by jury included speedier decisions,[101] jurors' willingness to accord greater significance to a patent's presumption of validity, dispensing with post-trial briefs and proposed findings, greater emphasis on excluding inadmissible evidence, and possibly appellate courts' reluctance to disturb jury decisions.[102] On the other side of the balance, juries have less capacity to comprehend complex issues in patent trials, jury trials can be more time-consuming, reversals of jury trials usually require new trials (whereas a judge can merely alter findings), and a patentee's request for a jury trial could be perceived as a sign of a weak patent.[103]

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purposes exclusive. This development gave to the equity judges full power of interpreting the patent instrument."); Gary M. Ropski, *Constitutional and Procedural Aspects of the Use of Juries in Patent Litigation (Part I)*, 58 J. PAT. OFF. SOC'Y 609, 609–10 (1976) (speculating that patent trial attorneys "believed that the fantastic pace of technological development began to exceed the ability of the lay juror in an action at law to comprehend many inventions").

[98] *See* ANNUAL REPORT OF THE DIRECTOR OF THE ADMINISTRATIVE OFFICE OF THE UNITED STATES COURTS 109 tbl.8 (1941).

[99] *See* Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 366–67 & fig.1 (2000).

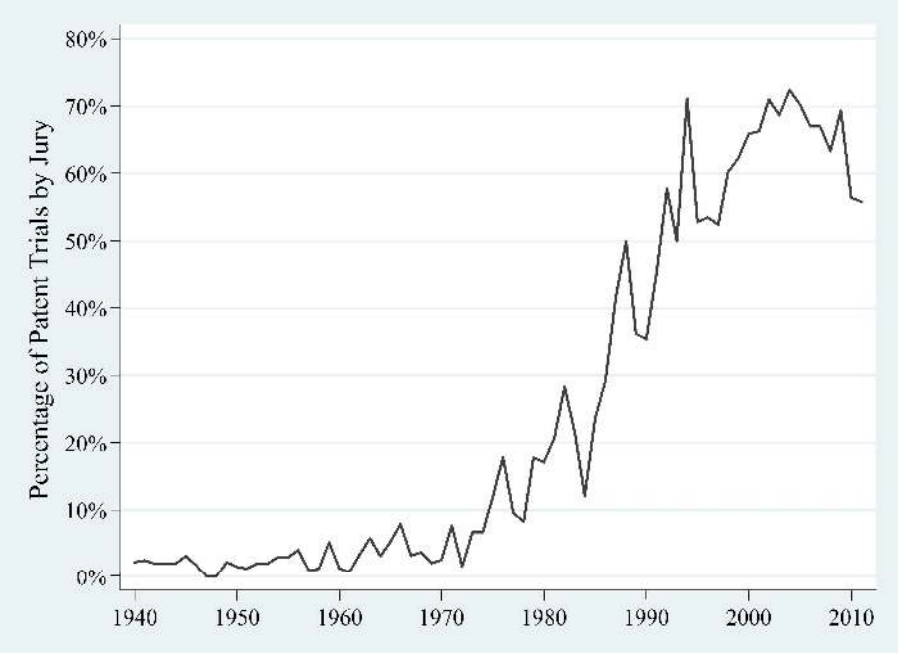
[100] Figure 1 is compiled from the ANNUAL REPORT OF THE DIRECTOR OF THE ADMINISTRATIVE OFFICE OF THE UNITED STATES COURTS, *supra* note 98, at 108–09 tbl.8, and later years. The number of patent trials per year varied from a high of 201 in 1941 to a low of 56 in 1946. The number has been relatively steady at about 100 patent trials per year since 1980.

[101] Judges in bench trials could take months to resolve the matter following the close of evidence, whereas jury verdicts are issued within a few days of closing arguments.

[102] *See* Ropski, *supra* note 97, at 612–13; *see also* Kimberly A. Moore, *Jury Demands: Who's Asking?*, 17 BERKELEY TECH. L.J. 847, 852 (2002) (noting that juries may be more favorably inclined toward patentees, "individuals over large corporations, domestic over foreign" enterprises, and local, in-state parties over out-of-state companies).

[103] *See* Ropski, *supra* note 97, at 612–13.

FIGURE 1: PERCENTAGE OF PATENT JURY TRIALS
(1940–2011)



Empirical research validates the instincts of the intrepid trial lawyers who ventured into litigating patent cases before juries. Using a database of patents litigated from early 1989 through 1996, Professors Allison and Lemley found that juries were more likely to favor patentees on patent validity—i.e., less likely to second-guess Patent Office decisions—than judges.[104] They also found that the Federal Circuit overturned jury verdicts slightly less frequently than bench trial decisions (13.3% versus 16.2%).[105] Using a database of tried patent cases from 1983 to 1999, then-Professor Moore found that juries ruled "for the patent holder more often on validity, infringement, and willfulness issues" and awarded higher damages than judges.[106]

By 1995, approximately 75% of patent cases were tried to juries. In most of those cases, trial judges did not construe the patent themselves but rather instructed the jury on claim construction.[107] One effect of this practice was to shroud the jury's claim construction in the black box of jury

[104] *See* John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 211–16 (1998).

[105] *See id.* at 242–43.

[106] *See* Moore, *supra* note 99, at 408.

[107] *See* Paul R. Michel, *The Challenge Ahead: Increasing Predictability in Federal Circuit Jurisprudence for the New Century*, 43 AM. U. L. REV. 1231, 1238 (1994).

deliberations, making jury patent decisions especially difficult to review. This problem precipitated major changes in patent case management.

B. The Emergence of Modern Claim Construction Standards

The resurgence of patent jury trials in the 1970s brought the allocation of claim construction responsibilities to center stage. During its first decade of operation, the Federal Circuit generated two arguably inconsistent lines of authority regarding the nature of claim construction determinations. One set of cases viewed the interpretation of patent claims as purely a question of law and hence outside of the jury's responsibility.[108] Another line of cases characterized claim construction as a mixed question of law based on underlying factual determinations.[109] In this second line of cases, the Federal Circuit generally permitted trial judges to instruct the jury on standards for claim construction.[110] As a result, district courts routinely delegated claim construction to the jury.[111] This insulated trial verdicts from reversal as the Federal Circuit would uphold the determination if substantial evidence supported the jury's claim interpretation in view of the sources in the record.[112]

In an article published in 1994, Federal Circuit Judge Paul Michel expressed that he could not recall a single jury trial "in which the trial judge defined the literal scope of the claim for the jury in clear, comprehensive, and mandatory instructions."[113] He lamented that "[w]hen the court delegates both construction and infringement to the jury's discretion, the jury is free to do almost anything it wishes."[114] Judge Michel noted that the Federal Circuit would soon take up the wisdom of this approach to construing patent claims in an en banc case. The *Markman* case[115] would initiate a jurisprudential roller coaster that continues to this day.

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[108] *See* SRI Int'l v. Matsushita Elec. Corp. of Am., 775 F.2d 1107, 1118–22, 1138–40 (Fed. Cir. 1985) (en banc); Fromson v. Advance Offset Plate, Inc., 720 F.2d 1565, 1569–71 (Fed. Cir. 1983); Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 770–71 (Fed. Cir. 1983) (five-judge panel); SSIH Equip. S.A. v. U.S. Int'l Trade Comm'n, 718 F.2d 365, 376 (Fed. Cir. 1983) (five-judge panel) (resting on the authority of Winans v. Denmead, 56 U.S. (15 How.) 330, 338 (1853)).

[109] *See* Tol-O-Matic, Inc. v. Proma Produkt-Und Mktg. Gesellschaft m.b.H., 945 F.2d 1546, 1549 (Fed. Cir. 1991); Palumbo v. Don-Joy Co., 762 F.2d 969, 974 (Fed. Cir. 1985); McGill Inc. v. John Zink Co., 736 F.2d 666, 671–72 (Fed. Cir. 1984).

[110] *See* Snellman v. Ricoh Co., 862 F.2d 283, 287–88 (Fed. Cir. 1988); Vieau v. Japax, Inc., 823 F.2d 1510, 1515–17 (Fed. Cir. 1987); Data Line Corp. v. Micro Techs., Inc., 813 F.2d 1196, 1200–02 (Fed. Cir. 1987) (rejecting the argument that the trial court was required to determine the scope and construction of the claim).

[111] *See* Michel, *supra* note 107.

[112] *See Snellman*, 862 F.2d at 286; *Data Line Corp.*, 813 F.2d at 1200; *Vieau*, 823 F.2d at 1515.

[113] *See* Michel, *supra* note 107.

[114] *See id.* at 1239.

[115] Markman v. Westview Instruments, Inc., 52 F.3d 967 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996).

1. The Markman *Crossroads: Claim Construction Is a Matter "Exclusively Within the Province of the Court."*—In *Markman v. Westview Instruments*, the jury found infringement of a patent for an "Inventory Control and Reporting System for Drycleaning Stores" after hearing expert testimony about the meaning of the term "inventory" as used in the patent claim.[116] On post-trial motions, the judge overturned the jury's verdict, explaining that the expert's testimony regarding the definition of "inventory" conflicted with "the ordinary and customary meaning of [this term], as well as the obvious meaning intended by the patentee, determined from the specifications, the drawings and the file histories of the original patent and the patent-in-suit."[117] In upholding the district court's judgment, a majority of the Federal Circuit sitting en banc concluded that the construction of patent claims is properly "a matter of law" that should not be given to the jury because of the "fundamental principle of American law that 'the construction of a written evidence is exclusively with the court.'"[118] The court grounded its determination on its reading of Supreme Court precedents and authorities dating back to the nineteenth century and patent law's notice function: "[I]t is only fair (and statutorily required) that competitors be able to ascertain to a reasonable degree the scope of the patentee's right to exclude."[119] The majority concluded that "[b]ecause claim construction is a matter of law, the construction given the claims is reviewed *de novo* on appeal."[120]

The majority opinion noted that a district court could, "in its discretion, receive extrinsic evidence in order 'to aid the court in coming to a correct conclusion' as to the 'true meaning of the language employed' in the patent."[121] Nonetheless, it emphasized that while such evidence can be used "for the court's understanding of the patent," it may not be used "for the purpose of varying or contradicting the terms of the claims."[122] In an effort to defeat Markman's Seventh Amendment challenge, the majority masked the inherent factual nature of claim construction in the context of controverted extrinsic evidence in instructing that although the trial judge may use

> certain extrinsic evidence that the court finds helpful and reject[] other evidence as unhelpful, and resolv[e] disputes *en route* to pronouncing the meaning of claim language as a matter of law based on the patent documents themselves, the court is *not* crediting certain evidence over other evidence or making factual evidentiary findings. Rather, the court is looking to the

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[116] *Id.* at 973.

[117] *See* Markman v. Westview Instruments, Inc., 772 F. Supp. 1535, 1537 (E.D. Pa. 1991).

[118] *Markman*, 52 F.3d at 978 (quoting Levy v. Gadsby, 7 U.S. (3 Cranch) 180, 186 (1805)).

[119] *Id.* at 978–79.

[120] *Id.* at 979.

[121] *Id.* at 980 (quoting Seymour v. Osborne, 78 U.S. (11 Wall.) 516, 546 (1871)).

[122] *Id.* at 981.

> extrinsic evidence to assist in its construction of the written document, a task it is required to perform.[123]

This self-contradictory statement—using some extrinsic evidence and rejecting other extrinsic evidence but not crediting evidence or making factual evidentiary findings—generated vehement responses from Judges Mayer and Newman. Judge Mayer accused the majority of "jettison[ing] more than two hundred years of jurisprudence and eviscerat[ing] the role of the jury preserved by the Seventh Amendment."[124] He emphasized the need to evaluate claims from the standpoint of the skilled artisan, which naturally brings extrinsic evidence into play.[125] Where such evidence is contested, claim construction requires fact-finding to resolve the controversy.[126]

The Supreme Court unanimously upheld the Federal Circuit's determination that "the construction of a patent, including terms of art within its claim, is exclusively within the province of the court."[127] It did so, however, in a manner that sidestepped the standard of appellate review, focusing instead on whether the right to a jury trial under the Seventh Amendment mandates that the jury decide factual disputes arising in patent claim construction. The Court applied its "historical test"[128]—determining first whether the cause of action (patent infringement) was tried at law at the nation's founding (or was analogous to one that was), and if so, whether "the particular trial decision must fall to the jury in order to preserve the substance of the common-law right as it existed in 1791."[129]

The Court characterized the "construing a term of art following receipt of evidence" as a "mongrel practice,"[130] "fall[ing] somewhere between a pristine legal standard and a simple historical fact"[131] without an "exact antecedent" in 1791.[132] It recognized that patent claims had not yet taken root in British and American patent practice, finding the closest analogue to claim construction to be interpretation of patent specifications for which "the mere smattering of patent cases that we have from this period shows no established jury practice sufficient to support an argument by analogy that today's construction of a claim should be a guaranteed jury issue."[133]

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[123] *Id.*

[124] *Id.* at 989 (Mayer, J., concurring in the judgment).

[125] *See id.* at 991.

[126] *See id.*

[127] Markman v. Westview Instruments, Inc., 517 U.S. 370, 372 (1996).

[128] *Id.* at 376 (quoting Charles W. Wolfram, *The Constitutional History of the Seventh Amendment*, 57 MINN. L. REV. 639, 640 (1973)).

[129] *Id.*

[130] *Id.* at 378.

[131] *Id.* at 388 (quoting Miller v. Fenton, 474 U.S. 104, 114 (1985)).

[132] *Id.* at 378.

[133] *Id.* at 379–80 (footnote omitted).

Lacking evidence of common law practice allocating interpretation of patents to the jury, the Court turned to "the relative interpretive skills of judges and juries and the statutory policies that ought to be furthered by the allocation."[134] Applying a functional analysis, the Court came down firmly on the side of allocating claim construction to the trial judge:

> The construction of written instruments is one of those things that judges often do and are likely to do better than jurors unburdened by training in exegesis. Patent construction in particular "is a special occupation, requiring, like all others, special training and practice. The judge, from his training and discipline, is more likely to give a proper interpretation to such instruments than a jury; and he is, therefore, more likely to be right, in performing such a duty, than a jury can be expected to be."[135]

The Court also noted "the importance of uniformity in the treatment of a given patent as an independent reason to allocate all issues of construction to the court," emphasizing the public notice function.[136]

In a critical passage bearing on the standard of appellate review, the Court noted that:

> It is, of course, true that credibility judgments have to be made about the experts who testify in patent cases, and in theory there could be a case in which a simple credibility judgment would suffice to choose between experts whose testimony was equally consistent with a patent's internal logic. But our own experience with document construction leaves us doubtful that trial courts will run into many cases like that. In the main, we expect, any credibility determinations will be subsumed within the necessarily sophisticated analysis of the whole document, required by the standard construction rule that a term can be defined only in a way that comports with the instrument as a whole. Thus, in these cases a jury's capabilities to evaluate demeanor, to sense the "mainsprings of human conduct," or to reflect community standards, are much less significant than a trained ability to evaluate the testimony in relation to the overall structure of the patent. The decisionmaker vested with the task of construing the patent is in the better position to ascertain whether an expert's proposed definition fully comports with the specification and claims and so will preserve the patent's internal coherence. We accordingly think there is sufficient reason to treat construction of terms of art like many other responsibilities that we cede to a judge in the normal course of trial, notwithstanding its evidentiary underpinnings.[137]

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[134] *Id.* at 384.

[135] *Id.* at 388–89 (quoting Parker v. Hulme, 18 F. Cas. 1138, 1140 (C.C.E.D. Pa. 1849) (No. 10,740)).

[136] *Id.* at 390.

[137] *Id.* at 389–90 (citations omitted).

Unlike the Federal Circuit's *Markman* decision,[138] the Supreme Court avoided characterizing patent claim construction as a "matter of law." Rather, consistent with the "mongrel" characterization of claim construction, the Supreme Court phrased claim construction as a matter "exclusively within the province of the court."[139]

The *Markman* decision revolutionized patent case management. Trial judges immediately began experimenting with different procedures for construing patent claims.[140] Within a short time, the concept of the "Markman hearing" became established and widely used as a pretrial proceeding to construe patent claims. Holding this hearing in advance of trial promoted settlement, aided in the development of expert reports, and provided a basis for summary judgment.[141]

2. Post-Markman *Confusion Regarding the Nature of Claim Construction Determinations and the Standard of Appellate Review.*—Barely three months after the Supreme Court's ruling in *Markman*, the Federal Circuit confronted the role of fact-finding in claim construction in its *Vitronics* decision.[142] The Federal Circuit set forth a claim construction hierarchy in which courts look first to the intrinsic evidence: the claims themselves, the specification, and the prosecution history, in that order.[143] The court noted that "[i]n most situations, an analysis of the intrinsic evidence alone will resolve any ambiguity in a disputed claim term. In such circumstances, it is improper to rely on extrinsic evidence."[144] The court cited to its en banc *Markman* opinion for the proposition that "where the public record unambiguously describes the scope of the patented invention, reliance on any extrinsic evidence is improper" and warned that "[a]llowing the public record to be altered or changed by extrinsic evidence introduced at trial, such as expert testimony, would make this right meaningless."[145] Consistent with that approach, the Federal Circuit concluded that the district court improperly relied upon extrinsic evidence "to vary or contradict the manifest meaning of the claims."[146] The Federal Circuit went further, however, in stating that "opinion testimony on claim construction should be treated with the utmost

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[138] *See* Markman v. Westview Instruments, Inc., 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370; *see also* Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1455 (Fed. Cir. 1998) (en banc) (characterizing claim construction as a "pure issue of law").

[139] *Markman*, 517 U.S. at 372, 378.

[140] *See* MENELL, *supra* note 17.

[141] *See id.* chs. 2, 5, 6, 7.

[142] Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576 (Fed. Cir. 1996).

[143] *See id.* at 1582–83.

[144] *Id.* at 1583.

[145] *Id.*

[146] *Id.* at 1585.

caution, for it is no better than opinion testimony on the meaning of statutory terms."[147]

In so doing, the court rekindled the self-contradictory statement in its majority opinion in *Markman*. District courts could rely on expert testimony to "understand" the underlying technology but not to reach the "proper construction" unless "the patent documents, taken as a whole, are insufficient to enable the court to construe disputed claim terms."[148] This cautionary language sought to bolster the questionable notion that claim construction was a pure question of law—a search within the documentary record—and warned district courts away from hearing from persons skilled in the art. It diverged from the Supreme Court's characterization of claim construction as a "mongrel practice" and its invocation of historical sources recognizing the need and value for trial courts to consider extrinsic evidence in determining the meaning of patent claims' terms to skilled artisans.[149]

The *Vitronics* opinion led district judges away from the use of and reliance on extrinsic evidence.[150] Notwithstanding that few district judges possess scientific or engineering training or clerks with such backgrounds, they were expected to master the technological arts to which a patent pertained as of the time the invention was made without reliance on experts. Even when they opted for a technology tutorial, trial judges would do so without putting the evidence on the record. They downplayed or omitted the experts' opinions and credibility assessments in their claim construction decisions.[151] Trial judges perceived that "fact-finding" as part of the *Markman* process risked running afoul of the *Vitronics* dictum—that instances in which the "patent documents, taken as a whole, are insufficient to enable the court to construe disputed claim terms . . . will rarely, if ever, occur"[152]—whereas opaque constructions referencing only intrinsic

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[147] *Id.*

[148] *Id.* (emphasis omitted).

[149] *See* Markman v. Westview Instruments, Inc., 517 U.S. 370, 378–90 (1996).

[150] *See* O'Malley et al., *supra* note 8, at 683 (noting that some judges believe that "*Vitronics* says I cannot listen to an expert, and that is what I think the law is") (remarks of Judge O'Malley).

[151] *See* Lucas Aerospace, Ltd. v. Unison Indus., L.P., 890 F. Supp. 329, 333 n.7 (D. Del. 1995) (Schwartz, J.) ("When two experts testify differently as to the meaning of a technical term, and the court embraces the view of one, the other, or neither while construing a patent claim as a matter of law, the court *has* engaged in weighing evidence and making credibility determinations. . . . But when the Federal Circuit Court of Appeals states that the trial court does not do something that the trial court does and must do to perform the judicial function, that court knowingly enters a land of sophistry and fiction."); *In re* Mahurkar Double Lumen Hemodialysis Catheter Patent Litig., 831 F. Supp. 1354, 1359 (N.D. Ill. 1993) (Easterbrook, J., sitting by designation) ("[J]udges should not pretend that all nominally 'legal' issues may be resolved without reference to facts. . . . What seems clear to a judge may read otherwise to [one skilled in the art].").

[152] *See Vitronics*, 90 F.3d at 1585. Although the Federal Circuit later clarified that its *Vitronics* decision did not bar use of extrinsic evidence to understand the technology and was merely a warning not to contradict clear intrinsic evidence, *see* Pitney Bowes, Inc. v. Hewlett–Packard Co., 182 F.3d

evidence stood a better chance of affirmance. Following the frustrating experience of conducting a *Markman* hearing without the ability to make factual determinations, district courts faced the prospect of de novo review by the Federal Circuit.

This predicament produced an alarming reversal rate for district court claim construction rulings. Then-Professor (now-Federal Circuit Judge) Kimberly Moore discovered that in the eight years following the Supreme Court's *Markman* decision, the Federal Circuit found errors in 34.5% of the claim construction terms that it reviewed and at least one claim construction error in 37.5% of all claim construction appeals.[153] Because claim construction errors often result in district court decisions being reversed or vacated,[154] the ramifications for district judges and litigants are significant.

This pattern demoralized federal district judges.[155] One district judge, reflecting on his success on appeal, stated:

> I have had nine of my cases appealed to the Federal Circuit. I have been affirmed in one. I have been affirmed in part in one. And I have been reversed in seven. That does not relieve me—and I am not proud of that. I don't throw that out as a challenge to anyone—far from it. My duty is to predict what they are going to say and follow the law. But I haven't had noticeable success in dealing with these matters.[156]

Division among Federal Circuit judges regarding the appropriate standard of appellate review continued to surface following the Supreme Court's *Markman* decision.[157] Judge Mayer, in particular, continued to press

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1298, 1308 (Fed. Cir. 1999), district judges continued to downplay their use of and reliance upon extrinsic evidence in construing patent claims.

[153] *See* Moore, *supra* note 7, at 239.

[154] *See* Moore, *supra* note 1, at 4, 13 (reporting, for the five years following the Supreme Court's *Markman* decision, that the Federal Circuit reversed or vacated the district court's decision in 81% of cases in which it found a claim construction error).

[155] *See* Mazumdar, *supra* note 8 (District Judge Marsha Penchman noted: "[When y]ou get reversed 37 percent of [the] time [on claim construction]; you might as well throw darts."); Moore, *supra* note 99, at 396 (Judge Samuel B. Kent of the U.S. District Court, Southern District of Texas, commented at a summary judgment proceeding: "Frankly, I don't know why I'm so excited about trying to bring this thing [patent suit] to closure. It goes to the Federal Circuit afterwards. You know, it's hard to deal with things that are ultimately resolved by people wearing propeller hats. But we'll just have to see what happens when we give it to them. I could say that with impunity because they've reversed everything I've ever done, so I expect fully they'll reverse this, too."); O'Malley et al., *supra* note 8 (quoting Judge Patti Saris of the U.S. District Court, District of Massachusetts, as stating that "the high reversal rate demoralizes many federal district court judges").

[156] Honorable William G. Young & R. Carl Moy, Panel Discussion, *High Technology Law in the Twenty-First Century: Second Annual High Technology Law Conference*, 21 SUFFOLK TRANSNAT'L L. REV. 13, 19 (1997) (citation omitted).

[157] *Compare* Metaullics Sys. Co. v. Cooper, 100 F.3d 938, 939 (Fed. Cir. 1996) (characterizing claim construction as a "mixed question of law and fact"), *abrogated by* Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448 (Fed. Cir. 1998) (en banc), *with id.* at 940 (Lourie, J., concurring) (noting that the

the view that the Federal Circuit owed deference to district court claim construction rulings,[158] eventually precipitating the Federal Circuit's en banc review of the appellate claim construction standard in *Cybor Corp. v. FAS Technologies, Inc.*[159]

In a sharply divided decision, the Federal Circuit reaffirmed that claim construction is purely a legal issue, subject to de novo appellate review. Writing for the majority, Judge Archer read the Supreme Court's *Markman* decision to classify claim constructing as "a legal question to be decided by the judge."[160] He emphasized the Supreme Court's concern for certainty and national uniformity[161] and bolstered his conclusion by negative implication: "Nothing in the Supreme Court's opinion supports the view that the Court endorsed a silent, third option—that claim construction may involve subsidiary or underlying questions of fact."[162] Judge Archer downplayed the Supreme Court's characterization of claim construction as a "mongrel practice"[163] "fall[ing] somewhere between a pristine legal standard and a simple historical fact,"[164] as merely "prefatory comments."[165] He latched on to the Supreme Court's ambiguous observation that

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Supreme Court did not overrule the de novo review standard); *see also* J.T. Eaton & Co. v. Atl. Paste & Glue Co., 106 F.3d 1563, 1577 (Fed. Cir. 1997) (Rader, J., dissenting) ("This court's role in reviewing claim meanings discerned by the district courts calls for modesty and restraint—born not of timidity, but of recognition of the limits inherent in appellate review."); Eastman Kodak Co. v. Goodyear Tire & Rubber Co., 114 F.3d 1547, 1555–56 (Fed. Cir. 1997) (holding that the district court correctly consulted extrinsic evidence and that the trial court is in the best position to evaluate this extrinsic evidence), *abrogated by Cybor*, 138 F.3d 1448; *id.* at 1563 (Lourie, J., dissenting) (arguing that extrinsic evidence should not be used to contradict the specification and that the "appellate court is equally well suited to read the specification" as the district court).

[158] *See* Serrano v. Telular Corp., 111 F.3d 1578, 1586 (Fed. Cir. 1997) (Mayer, J., concurring) (arguing that "this court may be required to give due deference to the trial court's factual findings" (citing *Metaullics Sys. Co.*, 100 F.3d at 939)); CVI/Beta Ventures, Inc. v. Tura LP, 120 F.3d 1260, 1261–62 (Fed. Cir. 1997) (Mayer, J., dissenting from denial of rehearing and suggestion for rehearing en banc) (contending that "[t]he Supreme Court in no way suggested that, where the district court found facts about the prior art or the skill and understanding of an artisan, the appellate panel could disregard these findings upon *de novo* review" and asserting that where a question of law is "informed by the resolution of factual disputes, we must separate the two and give each its proper measure of respect"); Fromson v. Anitec Printing Plates, Inc., 132 F.3d 1437, 1447 (Fed. Cir. 1997) (Mayer, J., concurring) (stating that "when, as here, there is vigorous dispute and conflicting evidence about the meaning of a term, the trial judge has to make findings of fact as he decides the meaning to ascribe to the patent"), *abrogated by Cybor*, 138 F.3d 1448.

[159] 138 F.3d 1448; Donald R. Dunner & Howard A. Kwon, Cybor Corp v. FAS Technologies*: The Final Say on Appellate Review of Claim Construction?*, 80 J. PAT. & TRADEMARK OFF. SOC'Y 481, 489–90 (1998) (noting the "extraordinary" sua sponte order to hear the *Cybor* case en banc before a panel decision issued).

[160] *Cybor*, 138 F.3d at 1455.

[161] *See id.* (quoting Markman v. Westview Instruments, Inc., 517 U.S. 370, 391 (1996)).

[162] *Id.*

[163] *Markman*, 517 U.S. at 378.

[164] *Id.* at 388 (quoting Miller v. Fenton, 474 U.S. 104, 114 (1985)).

[165] *See Cybor*, 138 F.3d at 1455.

> while credibility determinations theoretically could play a role in claim construction, the chance of such an occurrence is "doubtful" and that "any credibility determinations will be subsumed within the necessarily sophisticated analysis of the whole document, required by the standard construction rule that a term can be defined only in a way that comports with the instrument as a whole."[166]

Chief Judge Mayer, joined by Judge Newman, reiterated his longstanding view that the Federal Circuit must defer to the trial judge on the resolution of disputed factual issues that arise in claim construction.[167] Judge Rader dissented from the majority's pronouncements on claim interpretation, noting that the Federal Circuit had been so preoccupied with the applicability of the Seventh Amendment to claim construction that it had never squarely confronted the standard of appellate review of judge-determined claim construction rulings.[168] He openly questioned the ramifications of the court's claim construction guidance for transparency in the trial court's record and reasoning, worrying that the de novo standard would discourage and delay settlement.[169]

The *Cybor* decision did little to quell concerns about de novo appellate review of claim construction rulings.[170] Just as the decision came down, the wave of software and business method patent cases growing out of the dot-com bubble began reaching the district courts.[171] The continued high reversal rate[172] in conjunction with the Federal Circuit's unwillingness to grant interlocutory review of claim construction rulings fueled criticism of the patent litigation system.[173] The National Academies of Science and the

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[166] *Id.* at 1455–56 (quoting *Markman*, 517 U.S. at 389). This explanation, however, overlooks a critical passage in the Supreme Court's *Markman* decision. *See infra* Part IV.A; Peter S. Menell, Reconsidering *Cybor*: A Hybrid Standard of Appellate Review of Patent Claim Construction Rulings 10–13 (UC Berkeley Sch. of Law Research Paper July 5, 2013), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2289343 (reproducing Brief of Professor Peter S. Menell as Amicus Curiae Supporting Plaintiff–Appellee, Lighting Ballast Control LLC v. Philips Electronics North America Corp., 500 F. App'x 951 (Fed. Cir. July 1, 2013) (No. 2012-1014)).

[167] *See Cybor*, 138 F.3d at 1465–66 (Mayer, C.J., joined by Newman, J., concurring in the judgment).

[168] *See id.* at 1473–74 (Rader, J., dissenting in part, concurring in the judgment, and joining part IV of the en banc opinion).

[169] *See id.* at 1475–76.

[170] *See, e.g.*, Dunner & Kwon, *supra* note 159, at 497 (arguing that the de novo standard "may undermine the judicial role" in patent litigation and urging some deference to district courts).

[171] *See* NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., A PATENT SYSTEM FOR THE 21ST CENTURY 28–32 (Stephen A. Merrill et al. eds., 2004) (noting that a surge in patenting led to a doubling of "the number of patent lawsuits settled in or disposed by federal district courts" "between 1998 and 2001, from 1,200 to nearly 2,400").

[172] *See* Chu, *supra* note 7 (reporting a 44% reversal rate); Moore, *supra* note 7, at 239 (reporting a 37.5% reversal rate); Zidel, *supra* note 7, at 741–42 (reporting a 41.5% reversal rate).

[173] *See* Mazumdar, *supra* note 8; O'Malley et al., *supra* note 8, at 681–82 (remarks of Judge Patti Saris).

Federal Trade Commission undertook comprehensive studies of the problems plaguing the patent system.[174]

The Federal Circuit continued to tinker with presumptions and the hierarchy of sources in an effort to make claim construction more predictable. In *Texas Digital Systems, Inc. v. Telegenix, Inc.*,[175] another panel sought to further clarify the claim construction framework by recognizing dictionaries, encyclopedias, and treatises as "particularly useful resources to assist the court in determining the ordinary and customary meanings of claim terms" due to their public availability and objectivity.[176] The court noted that, unlike expert testimony, these reference sources are not "colored by the motives of the parties" or "inspired by litigation."[177] "Indeed, these materials may be the most meaningful sources of information to aid judges in better understanding both the technology and the terminology used by those skilled in the art to describe the technology."[178]

3. Omnibus Reconsideration of Claim Construction: Phillips v. AWH Corp.—The doctrinal adjustments following *Cybor* produced greater confusion[179] and higher reversal rates.[180] In an effort to address the inconsistency across its own decisions and quell the widespread dissatisfaction among district judges and practitioners with its claim construction jurisprudence, the Federal Circuit granted en banc review in *Phillips v. AWH Corp.*, a case appropriately struggling to interpret the term "baffles."[181] The court issued an unusual order[182] inviting briefs directed to

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[174] *See* FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY (2003); NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., *supra* note 171.

[175] 308 F.3d 1193 (Fed. Cir. 2002), *overruled by* Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

[176] *See id.* at 1202. The *Texas Digital* court drew in part on the statement in *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1584 n.6 (Fed. Cir. 1996), that "technical treatises and dictionaries . . . are worthy of special note." *Id.*

[177] *Id.* at 1203.

[178] *Id.*

[179] *See* Ben Hattenbach, *Chickens, Eggs and Other Impediments to Escalating Reliance on Dictionaries in Patent Claim Construction*, 85 J. PAT. & TRADEMARK OFF. SOC'Y 181, 189–90 (2003) (asserting that the use of dictionaries makes the claim interpretation process unpredictable); Jennifer R. Johnson, *Out of Context:* Texas Digital*, The Indefiniteness of Language, and the Search for Ordinary Meaning*, 44 IDEA 521, 540–41 (2004); *see also* O'Malley et al., *supra* note 8 (presenting a colloquy among three leading district court jurists with extensive experience with patent cases); *accord* SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc., 242 F.3d 1337, 1347 (Fed. Cir. 2001) (Dyk, J., concurring) ("Until we provide better [claim construction] guidance, I fear that the lower courts and litigants will remain confused.").

[180] *See* Moore, *supra* note 7 (reporting a 34.5% reversal rate); *see also* Schwartz, *supra* note 6, at 240 (finding a similar reversal rate).

[181] 415 F.3d 1303, 1309 (Fed. Cir. 2005) (en banc).

seven detailed questions, ranging from the role of evidentiary sources (dictionaries, specification, prosecution history, and expert testimony) to the standard of appellate review.[183]

With input from over thirty amicus briefs as well as briefs from the parties, the resulting decision affirmed the Federal Circuit's *Markman* framework whereby claims are to be given their ordinary and customary meaning from the perspective of one skilled in the art.[184] The majority emphasized the role of intrinsic evidence and especially of the specification in construing claims, observing that the specification is "[u]sually . . . dispositive" and "the single best guide to the meaning of a disputed term."[185]

The majority authorized trial courts to consider extrinsic evidence, but deemed it "less significant" and "less reliable" in determining the scope of claim terms.[186] It recognized that expert testimony can be useful "to provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field," but that "conclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court."[187]

While continuing to recognize the objectivity of dictionaries, the majority nonetheless backed away from *Texas Digital*'s presumption that a dictionary meaning would apply unless the term in question was explicitly defined in the specification or where the intrinsic evidence disavowed or disclaimed such meaning.[188] Such a methodology, in the court's view, improperly "focuses the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent."[189]

The court emphasized the specification as the primary source for interpreting patent claims, but acknowledged that "there is no magic formula or catechism" or "rigid algorithm" for conducting claim

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[182] *See* Ryan Vacca, *Acting Like an Administrative Agency: The Federal Circuit En Banc*, 76 MO. L. REV. 733, 740–42, 747 (2011) (characterizing the en banc order in *Phillips* as unusual in the scope of the questions posed and the process as akin to a Notice of Proposed Rulemaking under the Administrative Procedure Act).

[183] *See* Phillips v. AWH Corp., 376 F.3d 1382, 1383 (Fed. Cir. 2004) (en banc) (per curiam); *see also id.* at 1384 (Rader, J., concurring) (inviting comment on an additional set of questions); *id.* (Mayer, C.J., dissenting) (calling for the court to reconsider its en banc holdings in *Markman* and *Cybor* that claim construction is a pure question of law subject to de novo review).

[184] *See Phillips*, 415 F.3d at 1312–17.

[185] *Id.* at 1315 (quoting Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996)).

[186] *See id.* at 1317–18.

[187] *See id.* at 1318.

[188] *See id.* at 1320–21.

[189] *See id.* at 1321.

construction.[190] Trial judges may consider any particular source of evidence in whatever sequence they deem appropriate so long as they do not "contradict claim meaning that is unambiguous in light of the intrinsic evidence."[191]

The majority declined to revisit the scope of appellate review of claim construction rulings, noting that while it had considered the matter, it "decided not to address [the] issue at this time," leaving *Cybor*'s de novo standard in place.[192] Nonetheless, lingering division among the members of the court remained. While adhering to the view that claim construction is a question of law subject to de novo review, Judge Lourie, joined by Judge Newman, wrote separately to urge his colleagues "to lean toward affirmance of a claim construction in the absence of a strong conviction of error."[193] In dissent, Judge Mayer, joined by Judge Newman, reiterated his continued frustration with "the futility, indeed the absurdity, of this court's persistence in adhering to the falsehood that claim construction is a matter of law devoid of any factual component."[194]

4. Continuing Division over the De Novo Standard.—The division over the standard of appellate review has periodically resurfaced during the past several years.[195] In 2012, the Supreme Court indicated a willingness to revisit the topic. In reviewing a petition for certiorari challenging the Federal Circuit's de novo standard, the Court requested the views of the U.S. Solicitor General.[196] The Solicitor General recognized that "[t]he question whether deferential review is appropriate [when reviewing factual determinations in claim construction] is of substantial and ongoing importance in patent law."[197] However, the Solicitor General ultimately urged the Court to decline the writ of certiorari because the district court had not made "any factual findings or resolve[d] any evidentiary disputes in interpreting the patent claims at issue here."[198] The Court denied

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[190] *See id.* at 1324.

[191] *See id.*

[192] *See id.* at 1328.

[193] *See id.* at 1330 (Lourie, J., joined by Newman, J., concurring in part and dissenting in part).

[194] *See id.* (Mayer, J., joined by Newman, J., dissenting).

[195] *See* Retractable Techs., Inc. v. Becton, Dickinson & Co., 659 F.3d 1369, 1373 (Fed. Cir. 2011) (Moore, J., joined by Rader, C.J., dissenting from denial of rehearing en banc), *cert. denied*, 133 S. Ct. 833 (2013) (mem.); Trading Techs. Int'l, Inc. v. eSpeed, Inc., 595 F.3d 1340, 1350–51 (Fed. Cir. 2010); *id.* at 1363–64 (Clark, District Judge (E.D. Tex.), concurring); Medegen MMS, Inc. v. ICU Med., Inc., 317 F. App'x 982, 988–91 (Fed. Cir. 2008) (Walker, Chief District Judge (N.D. Cal.), dissenting) (urging greater deference); Amgen Inc. v. Hoechst Marion Roussel, Inc., 469 F.3d 1039, 1040 (Fed. Cir. 2006) (Moore, C.J., joined by Rader, J., dissenting from denial of rehearing en banc).

[196] Retractable Techs., Inc. v. Becton, Dickinson & Co., 133 S. Ct. 72 (2012) (mem.) (inviting the Solicitor General to file a brief).

[197] Brief for the United States as Amicus Curiae at 7, *Retractable Techs.*, 133 S. Ct. 833 (No. 11-1154), 2012 WL 5940288, at *7.

[198] *Id.* at *8.

certiorari in January 2013.[199] Just a few months later, the Federal Circuit granted en banc review of the standard of appellate review of claim construction rulings in *Lighting Ballast Control LLC v. Philips Electronics North America Corp.*[200]

II. EMPIRICAL RESULTS: THE IMPACT OF *PHILLIPS V. AWH*

In order to analyze the ongoing controversy over claim construction review, we developed a comprehensive database of appellate claim construction decisions from 2000 through 2011. This Part presents the results of our empirical study. Section A provides a brief review of previous empirical studies of patent claim construction. Then, section B describes the design of our study. Section C presents our results, including the overall trend in reversal rates, the evidentiary sources referenced in Federal Circuit decisions, judge-specific voting patterns, technology-specific patterns, the rate of summary affirmance, and the role of the skilled artisan perspective. Finally, section C interprets our principal finding—that claim construction reversal rates have dropped significantly since *Phillips*. We find that the drop in reversal rates is principally attributable to the emergence of informal deference to district court claim construction decisions at the Federal Circuit.

A. Previous Empirical Studies

The vicissitudes of the Federal Circuit's claim construction jurisprudence have resulted in numerous empirical studies. Prior to *Phillips*, the most comprehensive study of claim construction was conducted by then-Professor Kimberly Moore.[201] In two influential papers, Moore studied all precedential, nonprecedential, and summary affirmance claim construction decisions at the Federal Circuit from April 23, 1996 (the date of the Supreme Court's decision in *Markman*), through 2003.[202] She found that the Federal Circuit reversed claim construction decisions on 34.5% of appealed claim terms,[203] a rate that resulted in 29.7% of all appeals involving a question of claim construction being remanded or reversed.[204] Moore surmised that the high rate of reversal was due to the

[199] *See Retractable Techs.*, 133 S. Ct. 833, *denying cert. to* 653 F.3d 1296 (Fed. Cir. 2011).

[200] 500 F. App'x 951 (Fed. Cir. 2013) (per curiam).

[201] Moore, *supra* note 7.

[202] Moore, *supra* note 1, at 8–9; Moore, *supra* note 7, at 239.

[203] Moore, *supra* note 7, at 239. Judge Moore calculated reversal rates in three manners, which we discuss *infra* note 244. She found that 37.5% of cases involved the reversal of at least one term.

[204] *Id.* A finding of a higher reversal rate by term than by case is explained by the fact that a claim construction case contains at least one appealed claim term, but potentially more than one. Thus, a case that has ten terms, nine of which are affirmed, one of which is reversed, would have a 10% reversal rate by term, but count as one case reversed. If the case were remanded or reversed (as it likely would be

Federal Circuit's muddled claim construction jurisprudence.[205] Several follow-on studies substantiated Moore's findings of high reversal rates pre-*Phillips*.[206]

Professors R. Polk Wagner and Lee Petherbridge's empirical work focused on the methodological split among Federal Circuit judges.[207] Their study grouped judges into three categories: (1) proceduralists, who give primary weight to the claim language (and the ordinary meaning, often derived from dictionaries); (2) holistics, who interpret patent claim terms using an open-ended methodology drawing upon the full range of interpretive tools—claim language, specification, prosecution history, dictionaries, and expert testimony; or (3) "swing" judges, a middle group that does not subscribe to either the procedural or holistic methodology.[208] They found that claim construction appeal outcomes were highly dependent on the composition of the appellate panel,[209] which substantially explained both pre- and post-*Phillips* appellate decisions.[210] Wagner and Petherbridge could not confirm that *Phillips* had a "significant impact on the stability and predictability" of claim construction.[211]

Professor David Schwartz has examined whether district court judges improve their performance of claim construction over time.[212] He found no evidence that district judge reversal rates dropped as judges gained experience.[213] Schwartz suggested three possible explanations for his

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unless other issues such as infringement allow for affirmance), the case would be coded as one reversed case.

[205] *Id.* at 247.

[206] *See* Bender, *supra* note 6, at 203, 207 (finding a 40% reversal rate from 1996 to 2000); Chu, *supra* note 7, at 1092, 1104 (finding a 44% reversal rate from 1998 to 2000); Zidel, *supra* note 7, at 741–42 (finding a 41.5% reversal rate in 2001). Many of these studies found the reversal rate to be much higher than that reported by Judge Moore. The higher rates in these later studies were due to the omission in the follow-on studies of summary affirmance cases. *See* Moore, *supra* note 7, at 235–38 & nn.15–17. A significant minority of claim construction appeals are decided through the Rule 36 process. For example, Judge Moore's study found 104 relevant Rule 36 cases over the time period analyzed. Over that same span, there were 651 relevant opinion cases. *Id.* at 239 & n.31. Failing to include such cases overestimates the reversal rate because all Rule 36 decisions are affirmances.

[207] Wagner & Petherbridge, *supra* note 1, at 1110–11.

[208] *Id.* at 1111 & n.19, 1112.

[209] *Id.* at 1112, 1158–59.

[210] Wagner & Petherbridge, *supra* note 11 (manuscript at 133–38).

[211] *Id.* (manuscript at 142).

[212] Schwartz, *supra* note 6, at 225. Schwartz's study examined every case between April 24, 1996, and June 30, 2007, in which a construed claim term was appealed. *Id.* at 238.

[213] *Id.* at 267. Professor Schwartz's study included all appellate claim construction decisions: precedential, nonprecedential, and Rule 36. *Id.* at 238. His study's reversal rate is similar to that of Judge Moore's study: 33.9% of terms were wrongly construed in Schwartz's study compared to 34.5% of terms in Judge Moore's study. *Id.* at 240. Schwartz's study includes nearly two years of cases decided after *Phillips* whereas Moore's study preceded *Phillips*. Schwartz does not indicate or suggest that either the reversal rate or judges' ability to "learn" how to construe claims has improved after *Phillips*.

findings: (1) inherent indeterminacy in claim construction, (2) failure of the Federal Circuit to properly instruct district courts, or (3) failure of district court judges to learn how to perform claim construction.[214] Schwartz concluded by calling for further study of the "cause" of the high claim construction reversal rate.[215] Schwartz has also found that the reversal rate of claim construction cases in the pre-*Markman* era was much lower than that of the post-*Markman* era.[216]

B. Our Study

1. Design and Methodology.—The database that we created for this study contains every appellate claim construction decision issued between January 1, 2000, and December 31, 2011. It includes all precedential, nonprecedential, and summary affirmance (Rule 36) opinions.[217] The database covers 1930 individual claim terms from 1067 cases. Some cases in the database involve a single disputed claim term, while some involve multiple terms.[218]

In order to identify relevant cases, we performed an overinclusive search on LexisNexis to capture all patent-related appeals in which the Federal Circuit discussed the proper construction, definition, or interpretation of claim language. The results of that search were then examined by human coders to determine whether the cases were relevant to our study. A case was deemed relevant if the Federal Circuit reviewed the district court's construction of a claim term.[219]

Rule 36 of the Federal Circuit's Rules permits the court to enter a judgment of affirmance without written opinion in certain cases.[220] Because summary affirmances lack a written opinion, we established a separate protocol for determining relevancy of such cases. A LexisNexis search was performed that returned all patent cases that resulted in a Rule 36 affirmance from 2000 to 2011. Human coders then examined the appellate briefs of each case to determine relevancy. A Rule 36 case was deemed relevant for the study if the briefs challenged the district court's

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[214] *Id.* at 267.

[215] *Id.* at 267 n.219.

[216] David L. Schwartz, *Pre*-Markman *Reversal Rates*, 43 LOY. L.A. L. REV. 1073, 1093 fig.A (2010) (finding a 20.8% reversal rate pre-*Markman*).

[217] For a critique of studies that fail to include Rule 36 cases, see Moore, *supra* note 7, at 234–35.

[218] Each term occupies a separate entry in the database. On average, each case contains 1.8 appealed claim terms.

[219] A few cases involved appeals of the district courts' failure to construe a claim. In such cases, the term was included in the database only if the Federal Circuit directly construed the claim. If the Federal Circuit merely reviewed the decision not to construe, the term was not included in the database.

[220] FED. CIR. R. 36.

construction of a claim term. Further details on the specifics of relevancy determinations can be found in Appendix A.[221]

Once we accumulated the relevant cases, we hand coded each case and each claim term across three broad categories of information: case data, claim term data, and construction evidence. The data are described more fully in Appendix A. Of particular relevance for reversal rates, we coded each claim term's final disposition on appeal as either (1) affirmed, (2) reversed, or (3) avoided.[222] Similarly, each case was coded with a final disposition. Rule 36 cases were automatically coded as "affirmed."

The time period of our study (2000–2011) was selected for several reasons. First, the period provides a balanced frame to evaluate the Federal Circuit's tendencies before and after its *Phillips* decision. *Phillips* was decided around the midpoint of our study period (July 12, 2005), allowing us to compare a large number of appealed claim terms from the five-and-one-half-year period before *Phillips* and the six-and-one-half year period following *Phillips*.[223] Second, the twelve-year period provides a large amount of data sufficient for an empirical assessment of *Phillips*'s impact. Lastly, 2000–2011 represents a relatively stable era for the Federal Circuit. Of the eleven judges in active status on January 1, 2000, all but one served on the court through the entire period of our study.[224] The sole exception, Chief Judge Michel, served on active status until his retirement on May 31, 2010.[225] During the time period of our study, six judges were added to the Federal Circuit: Judges Dyk, Prost, Moore, O'Malley, Reyna, and Wallach.[226] The latter three judges have not heard a significant number of claim construction cases over the time period of our study.[227] The relative stability of the court during this time period reduces the likelihood that any

[221] David Schwartz has used a similar method to determine relevance to claim construction. *See* Schwartz, *supra* note 6, at 239.

[222] "Avoided" terms (eighty-five terms total) were not included in the results section of this Article because they do not constitute either affirmances or reversals. *See* Appendix A.

[223] The database includes 1010 claim terms from the period before *Phillips* and 885 claim terms from the period after *Phillips*.

[224] A number of judges took senior status during the period of our study: Judge Plager (2000), Judge Clevenger (Feb. 1, 2006), Judge Schall (Oct. 5, 2009), Judge Mayer (June 30, 2010), and Judge Gajarsa (July 31, 2011). *See* Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc., 682 F.3d 1003, 1004 (Fed. Cir. 2012); *Judges*, U.S. COURT OF APPEALS FOR THE FED. CIRCUIT, http://www.cafc.uscourts.gov/judges (last visited Jan. 13, 2014). All five remained on the court during the duration of the time period of our study.

[225] *Chief Judge Michel Will Retire on May 31, 2010*, U.S. COURT OF APPEALS FOR THE FED. CIRCUIT, http://www.cafc.uscourts.gov/index.php?option=com_%20content&view=article&id=3:chief-judge-michel-will-retire-on-may-31-2010 (last visited Jan. 13, 2014).

[226] *Judges*, *supra* note 224.

[227] Judge O'Malley heard ten of the cases that are included in our database; Judge Reyna heard seven; Judge Wallach did not hear any.

changes that we observe after *Phillips* were attributable to changes in personnel.[228]

2. Limitations of the Database.—As with any empirical examination of judicial behavior, there are a number of limitations that should be acknowledged. First, our dataset is limited to appellate decisions. District court judges construe an enormous number of claim terms that are never appealed to the Federal Circuit. Our study is not designed to capture those unappealed claim terms. It is possible that district courts are much more accurate in construing claims than is generally acknowledged and that claim construction reversal rates would be lower if every construed term were appealed. Our study, however, is not designed to answer the question of district court accuracy.[229] Rather, it examines appellate behavior and the impact of *Phillips* on that behavior.

The second potential drawback to our methodology is the selection bias inherent in an examination of appellate decisions. Economic theory suggests appellate cases represent those cases in which rational actors are most likely to disagree on the correct outcome.[230] While critics have pointed out that actual affirmance rates at appellate courts do not support this theory,[231] it is undoubtedly true that appealed claim terms, on average, represent those claim terms that are most difficult to construe. Again, however, our study is not meant to determine the rate of correct claim construction. We are concerned only with appellate practice, and thus, restricting our study to appealed claim terms provides the best evidence from which to make claims about appellate behavior. Furthermore, there are good reasons to suspect that the Priest–Klein framework is less applicable when examining a subset of appealed *issues* rather than all appealed *cases*.[232]

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[228] An additional benefit of the time period of our study is that, with minor exceptions, all of the briefs and opinions needed for our study were accessible through online databases. Only the briefs of Rule 36 cases decided between January and May of 2000 were not accessible via LexisNexis or Westlaw as of the time of this writing. To determine relevancy and to code these cases, we searched the archives at the Federal Circuit library. Our thanks to the excellent librarians at the court.

[229] For a discussion of the value of such district court accuracy, see Moore, *supra* note 1, at 28–29. *See also* Schwartz, *supra* note 6, at 226 (noting that the high reversal rate of district court judges' claim construction leads to unpredictability and discourages settlement).

[230] *See* George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1, 4, 16–17 (1984).

[231] *See* Jason Rantanen, *Why Priest–Klein Cannot Apply to Individual Issues in Patent Cases* (Univ. of Iowa Legal Studies Research Paper No. 12-15, 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2132810. *But see* Daniel Kessler et al., *Explaining Deviations from the Fifty-Percent Rule: A Multimodal Approach to the Selection of Cases for Litigation*, 25 J. LEGAL STUD. 233, 236–42 (1996) (determining that the Priest–Klein predicted win rate of 50% is accurate when the underlying assumptions of their model hold true).

[232] *See* Rantanen, *supra* note 231. For a more complete discussion of selection effects in claim construction empirical research, see Schwartz, *supra* note 216, at 1101–07.

That is not to say, of course, that our study is immune from concerns about the data. If the distribution of appealed cases changed significantly near the date of the *Phillips* decision, we would observe a change in reversal rates (or other data) that is, in fact, unrelated to the *Phillips* decision. Appellate courts are incredibly complex institutions; we cannot hope to isolate all of the inputs that affect the outcome of any particular appeal. We do not suggest that *Phillips* is the only factor in claim construction appeals over the time period of our study. Countless other economic, legal, political, and social factors have changed during the course of our study.

Lastly, as with any hand-coded database, there are concerns about the quality of the data. We have taken a number of steps to ensure that the dataset is reliable. First, we only utilized coders with scientific backgrounds. All of the coders participated in a one-semester course about claim construction or equivalent training. A coding manual describing the coding procedure was created in order to increase reliability. Additionally, we double coded many cases in order to test inter-rater agreement. Cohen's Kappa was chosen as the test of inter-rater reliability.[233] For the majority of coding related in this article, Cohen's Kappa ranged from 0.845 to 0.978.[234] In general, we found the reliability of the coding system to be high.

We also compared portions of our dataset with Kimberly Moore's studies to gauge the accuracy of the cases chosen for our study. Moore's studies contain a time period that overlaps with our study (2001–2003).[235] The results from the two studies are very similar: our database contains 603 terms over that time period, while Moore's database included 604;[236] our

[233] Mark A. Hall & Ronald F. Wright, *Systematic Content Analysis of Judicial Opinions*, 96 CALIF. L. REV. 63, 113–14 (2008) (stating that it is crucial to use a measurement of intercoder reliability, such as Cohen's Kappa).

[234] Cohen's Kappa ranges from 0 to 1, with numbers near one indicating higher degrees of reliability. *Id.* For claim term outcomes (agree/disagree) our database had a Cohen's Kappa of 0.940. For case relevance, our database had a Cohen's Kappa of 0.890. For panel composition, our database had a Cohen's Kappa of 0.978. For evidentiary sources, our database had a Cohen's Kappa of 0.845.

[235] Although Moore's published studies give only cumulative results, by comparing the results from her first study, Moore, *supra* note 1, at 4, 11–14 (covering 1996–2000), with that of her follow-up piece, Moore, *supra* note 7, at 239–45 (covering 1996–2003), we were able to obtain results from 2001 to 2003. Her first publication reports a total of 496 terms, *see* Moore, *supra* note 1, at 23, while her follow-up piece reports 1100 terms, *see* Moore, *supra* note 7, at 243–44; thus a total of 604 were identified in the interim period of 2001 to 2003.

[236] It should be noted that we did not include all of those 603 claim terms in the results of this Article. We choose not to use appeals arising from claim construction decisions at the United States Patent and Trademark Office because of the differing standards with which the Patent Office and district courts construe claims. See Appendix A for a discussion of the cases we excluded from the final results of this Article.

data indicate a reversal rate of 39.4% over that period, while Moore finds the rate to be 39.7%.[237]

C. Empirical Results: Has Claim Construction at the Federal Circuit Changed Since Phillips*?*

1. Reversal Rates.—Prior to *Phillips*, the reversal rate of claim construction appeals at the Federal Circuit was widely perceived as unacceptably high.[238] Critics argued that the high reversal rate demonstrated that the Federal Circuit was failing to reduce the uncertainty surrounding patent rights. Furthermore, the uncertainty involved in the claim construction appeal process was frustrating to both district court judges and judges on the Federal Circuit.[239] Patent holders and technology companies also complained about prolonged and increasingly expensive litigation. The *Phillips* decision was in part designed to reduce the reversal rate of claim construction appeals at the Federal Circuit.[240]

The perception of high reversal rates during the period before *Phillips* is supported by the data. During the five-and-one-half years prior to *Phillips* (January 1, 2000–July 12, 2005), the reversal rate was 37.2% for appealed claim terms.[241] Measured by cases with at least one erroneously construed term, the pre-*Phillips* reversal rate was 40.6%.[242] The result of the frequent claim term reversals was that 30.2% of pre-*Phillips* cases were reversed, vacated, or remanded due to an erroneous claim construction at the district court level.[243]

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[237] We calculated Moore's reversal rate for 2001 to 2003 as follows. First, we calculated the total number of reversed terms from 1996 to 2003. We believe that number is 379 reversed terms (34.5% reversal rate for 1100 total terms). *See* Moore, *supra* note 7, at 243–44. Second, we found the total number of reversed terms from 1996 to 2001: 139 (28% reversal rate for 496 terms). *See* Moore, *supra* note 1, at 23. Third, by subtracting the number of reversals from 1996 to 2001 from the number of reversals from 1996 to 2003, we obtained 240 reversals from 2001 to 2003. Lastly, we divided the number of reversals (240) from the total terms reviewed (604) for a 39.7% reversal rate.

[238] *See, e.g.*, Lefstin, *supra* note 7, at 1033 ("[I]f [claim] interpretation is at the core of patent law, there are many who claim that core is now rotten."); Jeffrey A. Lefstin, *The Measure of the Doubt: Dissent, Indeterminacy, and Interpretation at the Federal Circuit*, 58 HASTINGS L.J. 1025, 1026 n.2 (2007) ("Claim construction jurisprudence is in disarray. The United States Court of Appeals for the Federal Circuit reverses trial court claim construction decisions at a worryingly high rate. The proportion of Federal Circuit claim construction opinions that include separate concurrences or dissents continues to grow." (quoting Miller, *supra* note 6, at 177)); Timothy J. Malloy & Patrick V. Bradley, *Claim Construction: A Plea for Deference*, 7 SEDONA CONF. J. 191, 191 (2006) (suggesting that claim construction "remains as unpredictable as ever").

[239] Moore, *supra* note 1, at 29 ("Undoubtedly, with reversal rates so high, district court judges are frustrated with the claim construction process.").

[240] *See supra* Part I.B.

[241] $N = 952$ terms.

[242] Two hundred fifteen appealed cases contained erroneous constructions. $N = 530$ cases.

[243] For other studies calculating reversal rates, see Moore, *supra* note 7, at 239–45 (finding reversal rates between April 1996 and December 2003 of 34.5% on a term-by-term basis, 37.5% on a case-by-

Our data indicate that the reversal rate of claim construction appeals at the Federal Circuit has dropped substantially since *Phillips*. The reversal rate since July 2005 is 24.0% on a term-by-term basis. In that time the court has reversed at least one term in 29.5% of appeals, resulting in a remand, reversal, or vacation in 23.1% of cases. Table 2 summarizes the key statistics, while Table 3 provides year-by-year reversal rates by term.[244]

TABLE 2: PRE- AND POST-*PHILLIPS* REVERSAL RATES (2000–2011)[245]

	Pre-*Phillips*	**Post-*Phillips***
Percentage of terms reversed	37.2%	24.0%
Percentage of cases with at least one reversed claim term	40.6%	29.5%
Percentage of cases resulting in remand, reversal, or vacation due to claim construction error	30.2%	23.1%

TABLE 3: REVERSAL RATES BY YEAR

Year	**Reversal Rate**
2000	24.6%
2001	36.1%
2002	40.7%
2003	39.8%
2004	44.2%
2005	31.3%

case basis, and 29.7% on a by-case-impact basis), and Schwartz, *supra* note 6, at 240 (finding reversal rates over the same time period of 33.9% on a term-by-term basis, 38.8% on a case-by-case basis, and 29.3% on a by-case-impact basis). The higher reversal rates in our study are likely due to the different time periods studied. Neither Moore nor Schwartz included 2004 and the six months of 2005 in their calculations, eighteen months that saw an unusually high reversal rate. Over 45% of cases during those eighteen months involved at least one erroneous claim term ($N = 137$), and over 40% of terms reviewed were reversed ($N = 259$). Furthermore, Moore and Schwartz have over three years of cases prior to 2000 that were not included in our database.

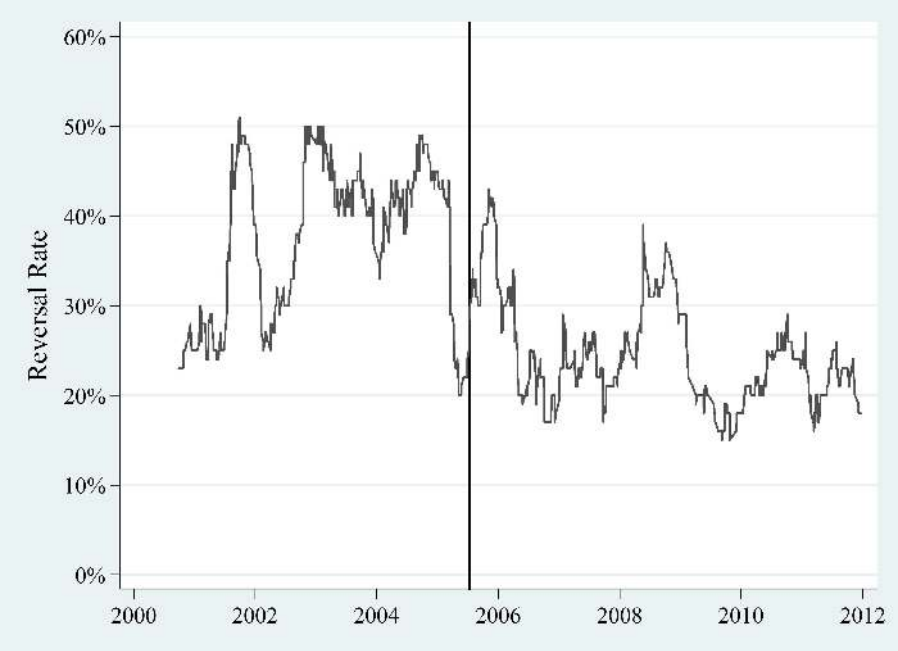
[244] Three primary methods exist for calculating claim construction reversal rates: by individual claim term (term-by-term); by cases with at least one reversed term (case-by-case); and by cases reversed, vacated, and/or remanded due to erroneous constructions (by case impact). *See* Moore, *supra* note 7, at 238. We report all three herein, but generally refer to term-by-term rates unless otherwise indicated.

[245] The relationship between pre- and post-*Phillips* cases and reversal rates was tested for an association using logistic regression. The model included other explanatory variables, including field of technology, district court, and Federal Circuit judges on the panel. From our logistic regression analysis, we estimate the odds of affirmance are 75% higher (95% confidence interval: 38% to 122% higher) in post-*Phillips* cases than in pre-*Phillips* cases. This estimate is statistically significant ($p < 0.001$).

2006	21.6%
2007	24.8%
2008	31.1%
2009	16.5%
2010	21.7%
2011	20.4%

Figure 2 shows the term-by-term reversal rate as a rolling average over 100 terms.[246]

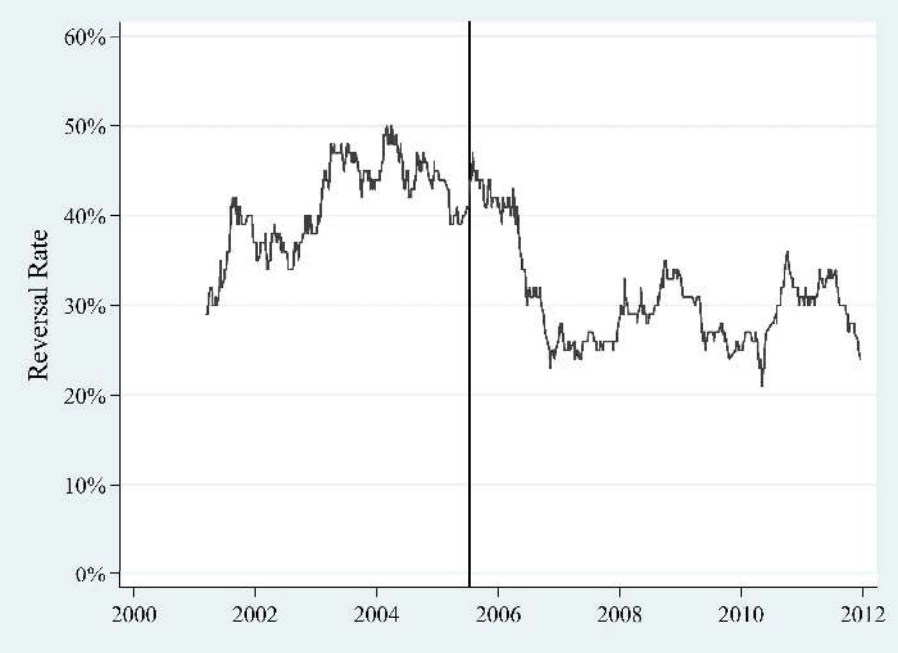
FIGURE 2: REVERSAL RATE—PER-CLAIM-TERM BASIS
(100 TERM ROLLING AVERAGE)



[246] The vertical reference line indicates the date of the *Phillips* decision. A similar demarcation line appears throughout this Article.

A similar pattern emerges for case-by-case reversals. Figure 3 illustrates the case-by-case reversal rate, which measures the rate at which the Federal Circuit reversed at least one term in claim construction cases.

FIGURE 3: REVERSAL RATE—PER-CASE BASIS (AT LEAST ONE TERM)
(100 CASE ROLLING AVERAGE)



Prior to *Phillips*, reversal rates on claim construction were much higher than reversal rates on other patent issues.[247] Historically, the Federal Circuit has reversed around 20% of appealed issues;[248] however, the court was reversing 37.2% of claim terms prior to *Phillips*. Now, the reversal rate for claim construction appeals is much closer to that of other patent-related

[247] *See* Ted Sichelman, *Myths of (Un)Certainty at the Federal Circuit*, 43 LOY. L.A. L. REV. 1161, 1175 (2010) (footnote omitted) (finding that from 2000 to 2007, "the average reversal rate across all issues other than claim construction [was] 18 percent, and 21 percent for all issues including claim construction"); Paul M. Schoenhard, *Reversing the Reversal Rate: Using Real Property Principles to Guide Federal Circuit Patent Jurisprudence*, 17 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 299, 300 (2007) ("There is a pervasive perception that the Court of Appeals for the Federal Circuit reverses district court rulings in patent cases at an inordinately high rate. . . . If one focuses, however, only on the rate at which district court decisions involving claim construction are reversed on appeal, the figure is higher than for patent cases generally.").

[248] *See* Moore, *supra* note 1, at 17 tbl.2 (examining every patent appeal from 1983 to 1999 and finding a 22% reversal rate across all appealed issues).

issues.[249] Our data—showing a reversal rate of 24.0% since *Phillips*—demonstrate that claim construction is no longer an extreme outlier at the Federal Circuit.

2. Evidentiary Sources.[250]—There are two main types of evidence courts can use when construing claims: intrinsic and extrinsic. Intrinsic evidence consists of evidence from the patent document and file wrapper. Within the patent document itself, courts can look to the claims and the specification. Additionally, courts can examine the prosecution history of the patent, the written record of the patent application, and correspondence between the applicant and the Patent Office.[251] District courts may also consult a variety of extrinsic sources in construing claim terms, including dictionaries, encyclopedias, and treatises; expert testimony; inventor testimony; and evidence of industry practice and norms.

Overall, the Federal Circuit's use of evidentiary sources remains largely unchanged since *Phillips*, with one significant but unsurprising exception: the court has substantially decreased its reliance on dictionaries.

a. Intrinsic evidence.—Drawing on prior claim construction jurisprudence, the *Phillips* opinion encouraged district courts to rely upon intrinsic sources when performing claim construction.[252] District judges have largely followed *Phillips*'s encouragement. As reflected in Figure 4, 92.5% of terms in our database were construed using at least one form of intrinsic evidence.[253] Most cases relied on several. That rate has not changed significantly since *Phillips* was decided.

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[249] Indeed, given the fact that claim construction decisions are afforded no deference, it is perhaps surprising that reversal rates are now so low. *Cf.* Lefstin, *supra* note 7 (arguing that a reversal rate of over 30% is consistent with reversal rates in other forms of complex litigation). Whereas many appealed issues involve formal deference to the decision of the judge or jury below, only legal questions are reviewed de novo. Questions of fact are reviewed under a "clearly erroneous" standard. Even questions of law, such as obviousness, that are decided by a jury are reviewed with a presumption favoring the jury's decision. Thus, only those issues of law that are decided by a judge (such as claim construction) are truly considered anew at the Federal Circuit. We consider this issue more fully in Part III *infra*.

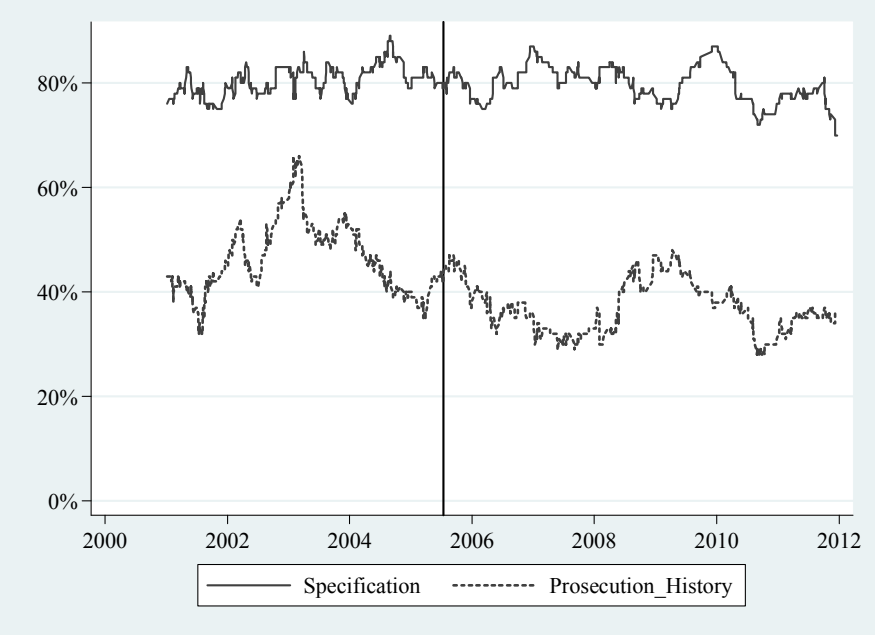
[250] Evidentiary statistics reported in this Article include only those cases that are precedential or nonprecedential. Rule 36 summary affirmances are not included because no written opinion is issued in those cases and therefore no analysis of evidentiary sources used by the Federal Circuit could be performed.

[251] One can analogize these three types to sources used in statutory construction, with the claims representing the statutory language, the specification representing the explanatory notes and primary legislative reports, and the prosecution history representing the legislative history.

[252] *See supra* notes 184–91 and accompanying text.

[253] That number has not changed much since *Phillips*: 93% before and 91.3% after.

FIGURE 4: USAGE OF INTRINSIC EVIDENCE
(100 TERM ROLLING AVERAGE)



Not surprisingly, the most common source that the Federal Circuit consults in determining claim meaning is the patent specification. The specification describes the invention and teaches others how to practice the invention.[254] Because the specification is statutorily required to contain a written description and an enabling disclosure of the invention,[255] it has long been a rich source of meaning for courts. From 2000 through 2011, over 80% of appealed claim terms were analyzed in light of the specification's teaching. The court relied heavily on the specification to determine claim meaning before (81.5% of terms) and after (80.2% of terms) *Phillips*. The use of the specification to interpret claims at the Federal Circuit has remained relatively consistent throughout the past decade.

There has been a decrease in the use of prosecution history since *Phillips*. Before *Phillips*, 46.9% of terms construed involved examination of the prosecution history, while the Federal Circuit has examined the prosecution history for only 37.1% of terms construed since that time.[256]

[254] Technically, the claims form part of the specification. However, claims have become much more important than the rest of the specification over the past century. Also, *Phillips* treats the claims as separate from the specification for purposes of claim construction. *See* Phillips v. AWH Corp., 415 F.3d 1303, 1311 (Fed. Cir. 2005) (en banc). We follow that practice.

[255] *See* 35 U.S.C. § 112 (2006).

[256] The drop in usage is statistically significant ($p < 0.001$).

This drop in usage is likely tied to the differing views on claim construction methodology that existed immediately prior to *Phillips*. The period preceding *Phillips* exhibited a peak in the use of prosecution history as construction evidence. Although *Phillips* confirmed that prosecution history was part of the intrinsic record, the opinion emphasized the relative importance of the specification and the claims as the most pertinent and useful guides in ascertaining claim meaning.[257] The use of prosecution history to construe claims post-*Phillips* appears to have returned to the rate observed in the early part of our study.

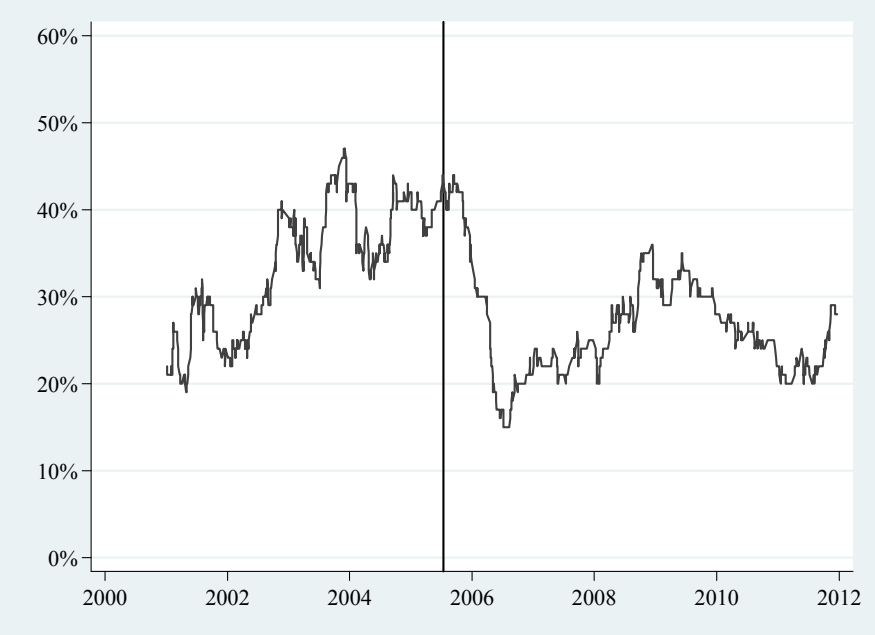
b. Extrinsic evidence.—The Federal Circuit has decreased its reliance on extrinsic evidence since *Phillips*. Figure 5 illustrates that leading up to the *Phillips* decision, the Federal Circuit was increasingly reliant on some form of extrinsic evidence in claim construction determinations.[258] A decline in the use of extrinsic evidence followed the decision. On average, before *Phillips* the Federal Circuit looked to extrinsic evidence with 33.2% of terms. Since then, the court has examined extrinsic evidence with only 26.3% of terms it has construed.[259]

[257] *See Phillips*, 415 F.3d at 1317 ("Yet because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes.").

[258] Extrinsic Evidence codes: (1) Dictionary/Treatise, (2) Expert, (3) Other.

[259] The drop in usage is statistically significant ($p < 0.005$).

FIGURE 5: USE OF EXTRINSIC EVIDENCE
(100 TERM ROLLING AVERAGE)

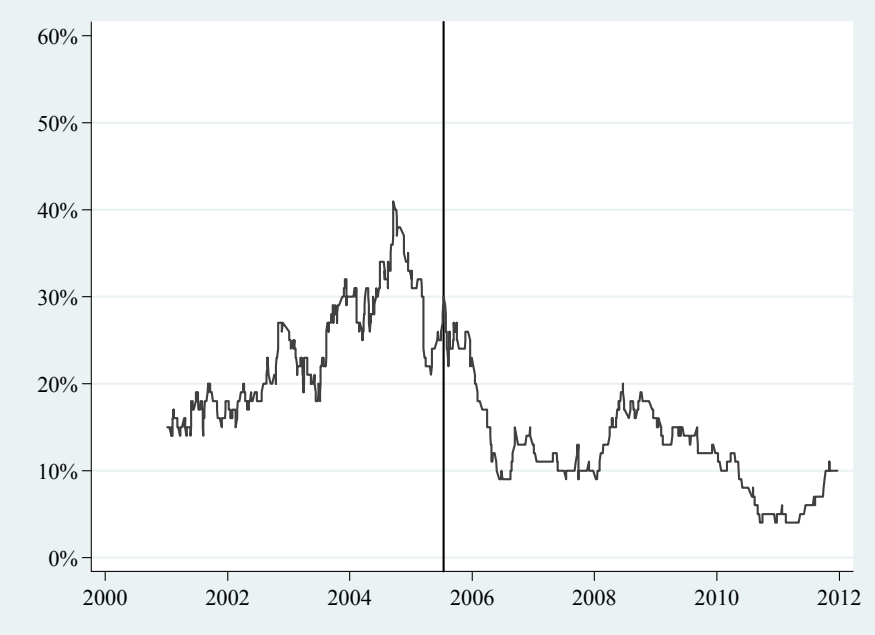


One type of extrinsic evidence—dictionaries—has become much less common post-*Phillips*. As one would expect, the Federal Circuit's use of dictionaries in claim construction rose significantly after the *Texas Digital* decision in 2002.[260] After *Phillips* reversed that line of cases, the use of dictionaries in construing claims declined precipitously, as reflected in Figure 6. Since *Phillips*, the Federal Circuit is much less likely to refer to a dictionary in construing a claim. Indeed in the last year of cases observed in this study (2011), dictionaries were used to define only 9.7% of terms, down from a high of 32.2% in the year before *Phillips* (2004).[261]

[260] *See* Texas Digital Sys., Inc. v. Telegenix, Inc., 308 F.3d 1193 (Fed. Cir. 2002), *overruled by Phillips*, 415 F.3d 1303.

[261] The drop in usage is statistically significant ($p < 0.001$).

FIGURE 6: USE OF DICTIONARIES
(100 TERM ROLLING AVERAGE)



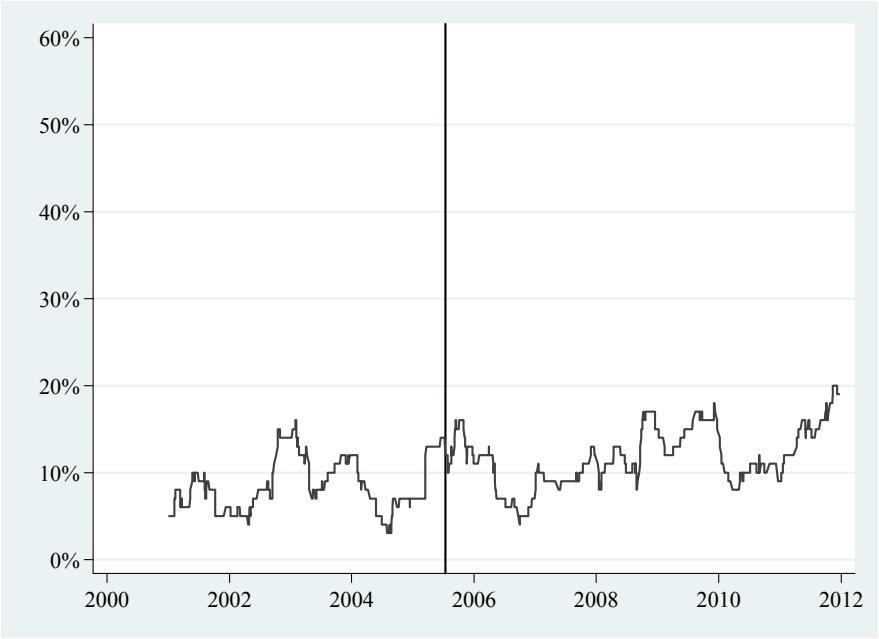
In contrast to dictionary usage, the Federal Circuit's use of expert evidence has increased slightly since *Phillips*. Overall, the Federal Circuit makes limited use of expert evidence in construing claims.[262] The consistently low use of expert evidence is unsurprising given the Federal Circuit's statement in *Vitronics* that expert evidence would "rarely, if ever" be necessary to construe claims.[263] Prior to *Phillips*, the court examined expert evidence in 8.8% of appealed claim terms. It has done so in 12.1% of terms since the decision.[264]

[262] In coding for the use of expert evidence, we did not differentiate between instances in which the Federal Circuit relied upon the evidence and when it rejected the use of such evidence. Thus, the statistics reported herein describe the instances in which the Federal Circuit referenced such evidentiary sources in its opinion.

[263] Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1583 (Fed. Cir. 1996).

[264] The drop in usage is statistically significant ($p < 0.05$).

FIGURE 7: USE OF EXPERT EVIDENCE
(100 TERM ROLLING AVERAGE)



c. Summary of evidentiary sources.—The range of evidentiary sources utilized in claim construction decisions has changed slightly since *Phillips*: the court continues to rely heavily on the patent specification, is slightly less likely to consult the prosecution history after *Phillips*, is slightly more likely to consult expert opinion, and is much less likely to consult dictionary definitions.

3. Judge-Specific Data.—Throughout the Federal Circuit's history, there has been a common perception that case outcomes are significantly influenced by the outlook of the individual judges on one's panel.[265] We assess this question by examining voting patterns by judge. A total of sixteen judges adjudicated more than twenty-five appealed claim terms during our study period. Several other judges heard a smaller number of terms and are not included in the table below. Most of the judges who heard fewer than ten terms were part of the Federal Circuit's initiative to invite federal judges from other courts (usually, but not always, district

[265] *See, e.g.*, John R. Allison & Mark A. Lemley, *How Federal Circuit Judges Vote in Patent Validity Cases*, 27 FLA. ST. U. L. REV. 745, 745 (2000) (discussing patent attorneys' belief "that the outcome of their case depends on the panel they draw"); *see also* Mary L. Jennings, *Should Advocates Be Informed of the Identities of Members of Judicial Panels Prior to Hearings?*, 6 FED. CIR. B.J. 41, 41–42 (1996) (noting Federal Circuit practice to inform parties of their panel composition on the day of argument).

court judges) to sit by designation. A smaller number of judges not included in the table below were Federal Circuit judges who died shortly after the initial period of our study or who joined the court near the end of our study.[266]

Table 4 presents the voting behavior of judges both before and after *Phillips*. The first and third columns indicate the percentage of terms for which each judge voted to reverse before and after *Phillips*, respectively. The second and fourth columns indicate the total claim terms adjudicated by each judge during the pre- and post-*Phillips* time periods. The final column indicates the change in rate of reversal votes since *Phillips*.

TABLE 4: INDIVIDUAL VOTING BEHAVIOR

Judge	% Reverse Votes: Pre-*Phillips*	# of Terms: Pre-*Phillips*	% Reverse Votes: Post-*Phillips*	# of Terms: Post-*Phillips*	Change, Reverse Vote Rate
Archer	35.2%	54	20.0%	35	-15.2%
Bryson	41.5%	236	20.0%	235	-21.5%
Clevenger	31.5%	235	26.9%	93	-4.6%
Dyk	49.1%	171	28.0%	214	-21.1%
Friedman	33.3%	63	27.1%	48	-6.2%
Gajarsa	30.2%	235	23.6%	237	-6.6%
Linn	49.8%	227	28.7%	261	-21.1%
Lourie	34.8%	233	21.1%	232	-13.7%
Mayer	35.6%	188	19.0%	195	-16.6%
Michel	34.9%	261	25.6%	142	-9.3 %
Moore	-	-	24.6%	171	-
Newman	30.0%	237	20.0%	225	-10.0%
Plager	30.8%	91	29.2%	48	-1.6%
Prost	32.2%	143	20.9%	234	-11.3%
Rader	38.5%	257	28.4%	261	-10.1%
Schall	42.0%	205	23.8%	185	-18.2%

There is some variation among the frequency of individual reversal votes.[267] Prior to *Phillips*, the individual reversal-vote rate varied from 30.0% to 49.8%. This wide spread indicates that in the years prior to

[266] Senior Judges Skelton and Smith died in 2004 and 2001, respectively. *See Biographical Directory of Federal Judges, 1789–Present*, FED. JUD. CENTER, http://www.fjc.gov/history/home.nsf/page/judges.html (last visited Jan. 13, 2014). Judge O'Malley was appointed in 2010; Judges Reyna and Wallach were appointed in 2011. *See Judges*, *supra* note 224.

[267] Judge Moore's study also found some variation. *See* Moore, *supra* note 1, at 25–26 (finding, pre-*Phillips*, that the affirmance-vote rate among judges with at least 100 terms construed to vary from 60% to 73%).

Phillips, panel composition may have had a large impact on outcome. Indeed, the spread is 1.5 times as large as the spread reported by Moore in the years prior to our study (1996–2000).[268] The large spread in our study may indicate that the period 2000–2005 was particularly polarized.

Since *Phillips*, the divergence among judge reversal rates has decreased. The range of individual reversal-vote rates since *Phillips* is 19.0%–29.2%. This narrower spread (around a mean of 24.0%) suggests that while claim construction decisions may still be influenced by panel composition,[269] there is less variance than in the pre-*Phillips* era. Also noteworthy is the way in which the voting patterns of certain judges have changed dramatically since *Phillips*. Many judges on the court have reduced their propensity to vote to reverse on claim construction by over 15%.

Chart 1 illustrates the change in reversal votes by judge. While judge-specific voting patterns are apparent (and likely inevitable for any difficult legal issue), there is a surprising dearth of dissents in claim construction cases. Over the twelve years we studied, there were 115 total dissents from the majority's claim construction—6.0% of all appealed terms.[270] For a legal issue that is commonly perceived to be fraught with ambiguity, the relative unanimity of claim construction decisions at the Federal Circuit is surprising. Interestingly, although claim construction dissents are relatively rare, they are more frequent during the period immediately preceding *Phillips*: eighteen of the dissents came in 2004, the year before *Phillips*, with another fifteen occurring in 2005. If dissents are a bellwether of change in claim construction jurisprudence, the nineteen dissents in 2010 suggest that the Federal Circuit is once again divided over claim construction review.

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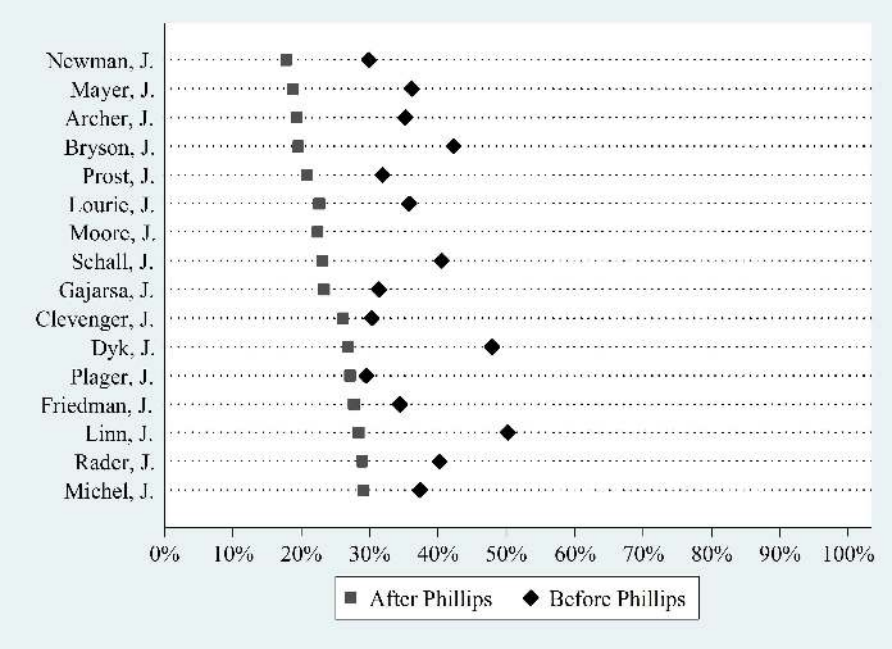
[268] *Id.*

[269] Shawn P. Miller, *Do "Fuzzy" Software Patent Boundaries Explain High Claim Construction Reversal Rates?* 22 (Aug. 30, 2012) (unpublished manuscript) (finding Judges Dyk, Linn, and Rader "significantly more likely to find claim construction error"), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2139146.

[270] Judge Moore's pre-*Phillips* study found dissents from 3% of appealed terms. *See* Moore, *supra* note 1, at 23.

CHART 1: PERCENTAGE OF REVERSAL VOTES BY JUDGE



4. Technology Areas.—Previous commentators have suggested that reversal rates may be tied to the increasing technological complexity of patents.[271] Our study revealed that high-tech fields do not dominate the Federal Circuit's claim construction docket: as Chart 2 demonstrates, mechanical inventions constitute the largest portion of the court's cases, albeit a shrinking portion.[272] Patents that are tied to the field of physics (acoustics, optics, energy-related, and semiconductors) make up a relatively small portion of the Federal Circuit's claim construction docket.[273] Patents associated with chemicals and pharmaceuticals make up a more sizable portion of the claim construction docket (12.5% and 6.2%, respectively),

[271] For an argument that this might be the case, see Chu, *supra* note 7, at 1106. *See also* Moore, *supra* note 1, at 3 (arguing that "the 33% error rate for claim construction creates doubt about the abilities of district court judges to adjudicate complex technical patent cases").

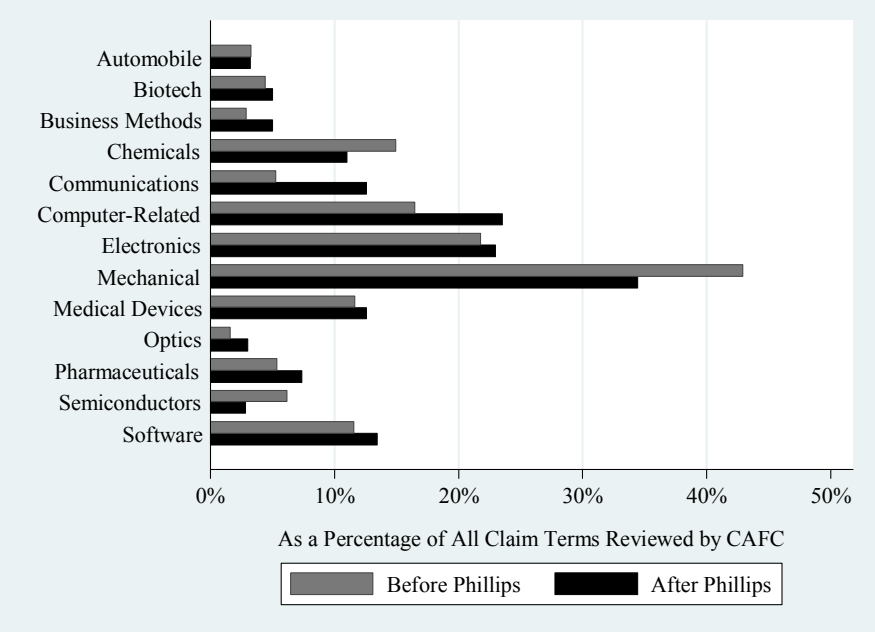
[272] This observation corresponds with the percentage of all patents that are mechanical inventions. *See* John R. Allison & Mark A. Lemley, *Who's Patenting What? An Empirical Exploration of Patent Prosecution*, 53 VAND. L. REV. 2099, 2114 (2000) (finding that 32.9% of all issued patents were mechanical inventions).

[273] None of those categories take up more than 4.5% of the claim construction docket on appeal. Energy-related and acoustic technologies comprise 2.4% and 2.2% of all patents, respectively, *see id.* at 2148 tbl.1, similar numbers to those patents' appearance in claim construction appeals (1.7% and 0.5%, respectively). Optics and semiconductor patents, on the other hand, do seem to be less frequently involved in claim construction appeals than would be predicted in a random distribution. Those technologies make up 12.8% and 9.3%, respectively, of all patents, *see id.*, yet only appear in 2.3% and 4.4% of claim construction appeals, respectively.

yet still a relatively small number of the overall terms in our database (15.2% of unique terms construed).[274] The ever-controversial category of business method patents appear in less than 3.9% of cases, yet nearly half of the appealed terms in that field are reversed.

One potential criticism of any time-sequence study of claim construction is that patented technologies are constantly changing and one era's valuable technologies may be easier to construe than another era's. And it is certainly the case that the most valuable technologies during the pre-*Phillips* period (2000–2005) differ from the valuable technologies of the post-*Phillips* period (2005–2011). During the period from 2005 to 2011, high-tech electronic devices experienced tremendous growth. Significant advances in communication technology—particularly wireless communications—also occurred in this period. The changing technological landscape is reflected in the increase that the court has seen in computer- and communications-related patents post-*Phillips* as shown in Chart 2 below. It should be noted throughout this section that due to technological overlap, we permitted multiple technological codings for the same patent. Thus, the technological composition of the cases we studied will add up to something more than 100%.

CHART 2: FREQUENCY OF APPEAL BY TECHNOLOGY



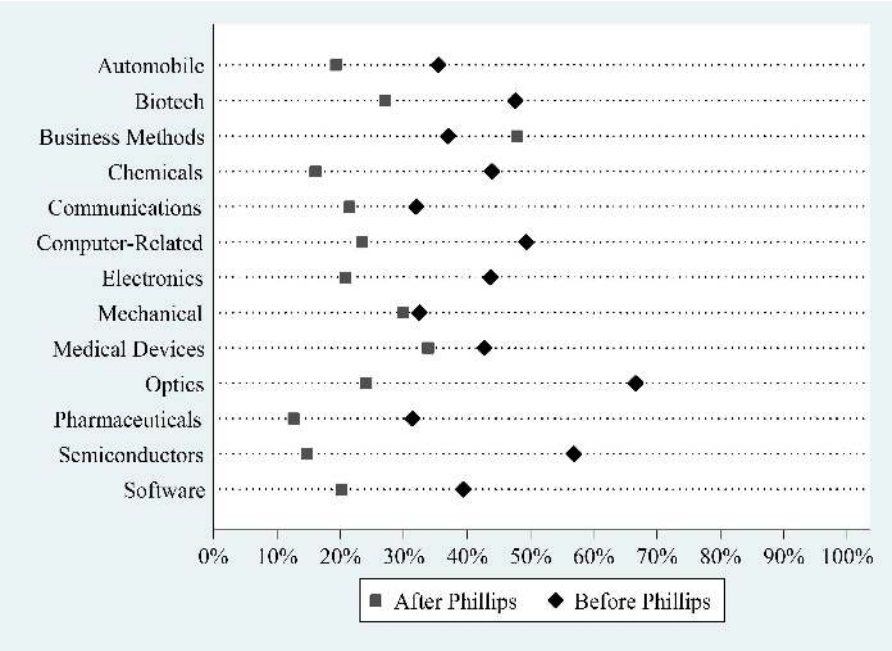
[274] Chemistry and pharmaceutical innovations constitute 28.5% of all patents issued. *Id.*

Although mechanical patents are still the largest single category of claim construction appeals, their frequency in appellate claim construction decisions has diminished significantly in the years following *Phillips*. Similarly, chemical patents make up a smaller portion of the Federal Circuit's claim construction cases in the six years following *Phillips*. Computer-related and communications technologies experienced the largest increase in frequency since *Phillips*. Claim construction appeals from pharmaceutical patent cases—one of the most frequently affirmed technology areas—are also more frequent since *Phillips*.

We cannot empirically rule out the possibility that the drop in reversal rate since *Phillips* is tied to the change in technological makeup. It does seem unlikely, however, that an increase in computer-related and communications technologies would *decrease* the Federal Circuit's likelihood of reversal. Many computer-related and communications patents are among the most complex and difficult-to-construe technologies. Furthermore, one might suspect that a drop in the percentage of mechanical inventions reviewed by the court would lead to an *increase* in the court's reversal rate because those patents are usually thought to be among the simplest. As demonstrated above, however, the data indicate precisely the opposite: in an era of increasing complexity, the Federal Circuit has significantly reduced its propensity to reverse on claim construction.

Chart 3 below provides more granulated data on technology reversal rates.

CHART 3: REVERSAL RATES BY TECHNOLOGY FIELD



Intriguingly, the only technology category that exhibits an increased reversal rate after *Phillips* is business methods. It is unclear why business method patents alone would exhibit an increase in reversal rate post-*Phillips*. The increase may be due to a growing suspicion of business method patents from either the Federal Circuit or the district courts. Alternatively, it may simply be the result of the relatively small number of business method patents in our database. All other fields experienced a reduction in reversal rates following *Phillips*. Appeals of pharmaceutical claim construction are less frequent[275] and have one of the highest affirmance rates of all technologies (80%). This comports with what many have suspected regarding the relative ease of accurately describing inventive single-molecule drugs.[276]

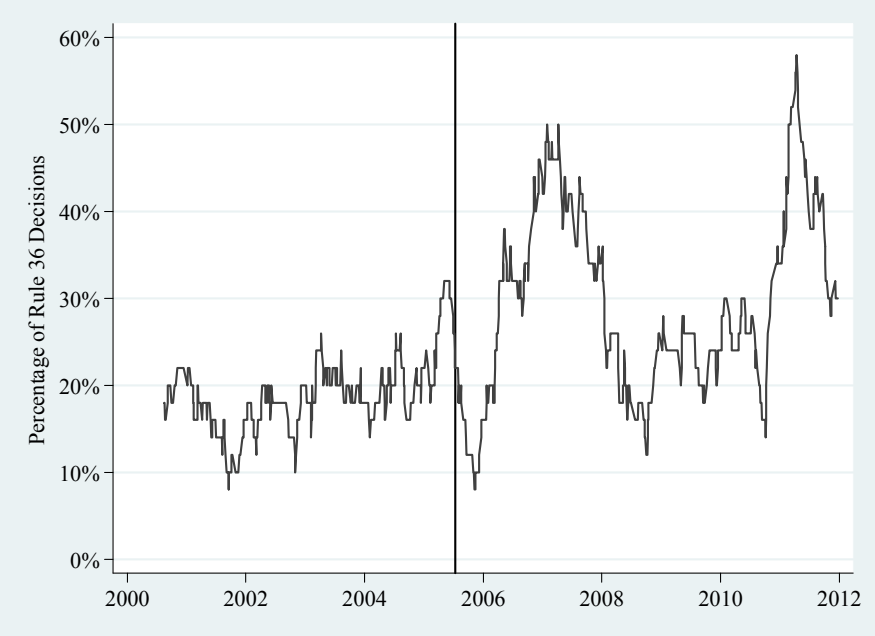
5. Procedural Aspects of Claim Construction Appeals.—The Federal Circuit's claim construction jurisprudence has begun to change procedurally as well as doctrinally. As reflected in Figure 8, the Federal

[275] Only 6.6% of claim construction appeals are pharmaceutical patents.

[276] *See* JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE 106–07 (2008) (observing that researchers have noted that chemical and pharmaceutical patents have more clearly defined boundaries than other types of patents).

Circuit has increasingly relied upon summary affirmances to dispose of claim construction appeals.[277] Whereas the court issued 18.7% of claim construction cases before *Phillips* under Rule 36—the rule that permits affirmance without opinion—it has done so in 30.2% of cases since that time.

FIGURE 8: SUMMARY AFFIRMANCES
(50 CASE ROLLING AVERAGE)



6. PHOSITA?—One of the most surprising results we found after examining over a decade of Federal Circuit claim construction decisions is the paucity of opinions that address the characteristics and views of the PHOSITA. Black-letter claim construction jurisprudence reaffirmed in the *Phillips* decision holds that courts must interpret claims from the standpoint of the person having ordinary skill in the art (PHOSITA).[278] One would expect, therefore, that many of the cases would identify the relevant PHOSITA for the particular technology at issue, either as to educational or technical background, experience, knowledge of the field, or other relevant determinants of "skill."

But the data, both pre- and post-*Phillips*, show very little discussion of the PHOSITA. In only 12 of the 787 (1.5%) written claim construction opinions issued from 2000 through 2011 does the Federal Circuit even identify the PHOSITA. This result is stunning when one

[277] FED. CIR. R. 36.
[278] Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc).

considers the central role that the PHOSITA occupies in claim construction. In spite of the PHOSITA's importance, the Federal Circuit rarely fleshes out what attributes the PHOSITA possesses. This may well be the result of the Federal Circuit's view of the diminishing importance of factual aspects of claim construction.

III. INTERPRETING THE RESULTS

Our most salient finding is the significant drop in claim construction reversals since the *Phillips* decision. That alone will be welcome news for many observers of the patent system. Increased certainty is beneficial for any property rights system. Lower reversal rates foster efficient bargaining between patent holders and those interested in making, using, and selling inventions. District judges can celebrate the greater deference accorded their decisions. And litigants will perhaps be better able to settle cases after a claim construction ruling or before appeal, thereby reducing their litigation costs and the disruption of their business.

Yet it is not clear why the reversal rate has fallen by approximately one-third following a decision that largely reaffirmed prior holdings and did not change the standard of review. As explained herein, we think the answer lies with the Federal Circuit itself. Although *Phillips* did not radically alter the law of claim construction, the data indicate that the case represented a triumph for legal realism at the court: faced with embarrassingly high reversal rates, the court entered an era of informal deference to district court decisions. Before setting forth our theory of informal deference, this Part will discuss other potential theories for the reduction in the reversal rate.

A. External Impact of Phillips

Perhaps the most obvious explanation for the reduction in claim construction reversals following the *Phillips* decision is that the decision reduced the frequency of legal errors by district courts. Because claim construction is an issue reserved for judges,[279] one possible explanation for our findings is that *Phillips* provided judges with an evidentiary hierarchy for performing claim construction which, if followed correctly, would better withstand appellate scrutiny. Essentially, the argument goes, district court judges now have a roadmap for crafting claim construction decisions that are more likely to withstand appellate review.

We think that there is some merit to this theory. Although the *Phillips* decision was a disappointment to many legal academics and practitioners—many of whom had hoped for a more rigorous standard for interpreting

[279] While some district courts rely heavily on magistrates or special masters to assist in claim construction, the ultimate arbiter of claim language is the district court judge. *See generally* Ronald B. Coolley, *Magistrates and Masters in Patent Cases*, 66 J. PAT. OFF. SOC'Y 374 (1984).

claim language—the decision undoubtedly altered the manner in which claim construction is handled at the district court level. Prior to *Phillips*, many district courts followed the Federal Circuit's *Texas Digital* standard. *Texas Digital* emphasized the importance of dictionaries in interpreting claims and led to litigation battles over which dictionary definition was the most appropriate in a given case. Such "battles of the dictionaries" were costly and unpredictable.[280] Indeed, our data indicate that the high-water mark for reversals occurred during the *Texas Digital* era.

But while this theory of improved guidance has some common-sense appeal, our data suggest that something more is driving the decline in reversal rates. First, if *Phillips* had reduced reversal rates simply by teaching district court judges the proper method of claim construction, we would expect to see reversal rates gradually drop over time. It should have taken several years for claim construction decisions by district court judges applying the *Phillips* framework to reach the Federal Circuit because claim construction rulings are appealable only upon a final decision (after grant of summary judgment or trial) and approximately a year in the appellate process.[281] Thus, if this first theory were operating, there should be a two-to-three-year lag in changes in reversal rates.

Instead of seeing a gradual reduction in claim construction reversals after a lag, we find a large and immediate decline in the reversal rate. Within one year of the *Phillips* decision, average reversal rates of the previous 100 terms had dropped from 45% to around 25%.[282] This indicates that the change that has occurred since *Phillips* is, at least in part, due to a change in the Federal Circuit's review. Indeed, it is difficult to see what change *Phillips* could have had on district court judges. The primary contribution of *Phillips* to claim construction jurisprudence was in firmly establishing the hierarchy between intrinsic and extrinsic construction evidence. However, the court has always relied heavily on intrinsic sources. As demonstrated in Part II.C.2, the use of intrinsic and extrinsic sources has not been radically altered since *Phillips*. Instead, we see a mild increase in the use of experts, a mild decrease in the use of prosecution history, and a dramatic decrease in the use of dictionaries. We doubt that the decreased reliance on dictionaries can, by itself, explain the dramatic reduction in reversal rates.

One could also speculate that *Phillips* may have instructed litigants in the types of claims that would be more likely to be reversed on appeal, thus altering the types of claims that were selected for appeal. We believe, however, that selection effects cannot fully explain the reduced reversal

[280] During the *Texas Digital* era, some law firms invested in acquiring hundreds of scientific dictionaries from different time periods.

[281] Judge Alan D. Lourie, A View from the Court (Sept. 27, 2008), *available at* http://www.cafc.uscourts.gov/images/stories/announcements/2008/AL_Williamsburg_Speech.pdf.

[282] *See infra* Figure 10.

rates at the Federal Circuit. Rational litigants reacting to a significant drop in reversal rates would appeal fewer overall terms, yet succeed more often in those appeals because they are only appealing the most meritorious claims. This reaction would lead to an *increase* in reversal rates as only the most egregious cases would be appealed. Instead, the reversal rate has *decreased*. As time has passed and litigants have had time to assess the impact of *Phillips*, the reversal rate has not returned to pre-*Phillips* levels.[283] In fact, the rate of reversal has continued to drop. The continued drop of reversal rates suggests that *Phillips*'s impact extends beyond instructing litigants as to the merits of their cases. Ultimately, we believe that the reduced claim construction reversal rates following *Phillips* are the result of something beyond merely better instructions for district judges and litigants.

B. Internal Impact of Phillips

1. Methodology.—Academics (and some Federal Circuit judges) have long suggested that claim construction at the Federal Circuit is plagued by panel effects. For example, Professors Wagner and Petherbridge have argued that the methodology employed by individual Federal Circuit judges is outcome determinative. Specifically, they found that characterization of a judge's methodology as either "proceduralist" or "holistic" had a statistically significant impact on claim construction outcomes.[284] Thus, one might argue that *Phillips*'s impact can be traced to the resolution of this interpretive debate identified by Wagner and Petherbridge.[285] According to that line of thinking, *Phillips* resolved an internal dispute among the judges with one camp's methodology prevailing over the other camp's.

We did not code for Wagner and Petherbridge's methodological distinctions, so we cannot comment on the continuing validity of their findings. However, looking at individual judges' voting patterns following *Phillips* reveals that whatever changes occurred following *Phillips* occurred across the entire court and not to a specific group of judges. The impact of *Phillips* appears much deeper than the resolution of a methodological divide.

Wagner and Petherbridge identify two types of decisionmakers: holistic and proceduralist. The "holistic" approach to claim construction is a "less structured analysis, utilizing the array of possible interpretive

[283] The most recent year studied, 2011, saw a reversal rate of barely over 20%, less than half the pre-*Phillips* level.

[284] Wagner & Petherbridge, *supra* note 1, at 1133–34 (defining what is meant by "procedural" and "holistic" methodologies).

[285] Note that Wagner and Petherbridge do not make this argument. In fact, they argue that *Phillips* did not change the methodological split on claim construction. *See* Wagner & Petherbridge, *supra* note 11 (manuscript at 133–38).

information in a flexible, case-specific fashion."[286] Proceduralists prefer to focus on the claim language and to search for the generally understood meaning of that language.[287] *Phillips* was largely a holistic victory: it emphasized a hierarchy of sources and encouraged judges to look to the patent document (particularly the claims and the specification) for meaning.[288] Thus, after *Phillips*, proceduralist judges may have felt that their method had been rejected and altered their voting patterns accordingly, while holistic judges, feeling vindicated, could have continued to vote as they always had.

Instead, we observe something different: both groups—holistics and proceduralists—changed their voting patterns in similar ways following *Phillips*. For example, as reflected in Figure 9, Judge Bryson (characterized as a holistic) dramatically reduces his rate of voting for reversals in claim construction cases following *Phillips*. Indeed, Judge Bryson appears to be the judge whose voting pattern is most affected by *Phillips*, as his tendency to vote to reverse drops by 21.5% following the decision. If the "*Phillips* effect" were solely the result of settling a methodological question amongst the judges, we would expect to see the "holistics"—those judges who were using *Phillips*'s methodology before the decision—to have relatively stable reversal votes before and after the decision. However, this is not the case. The judges identified as holistics significantly altered their voting behavior.[289]

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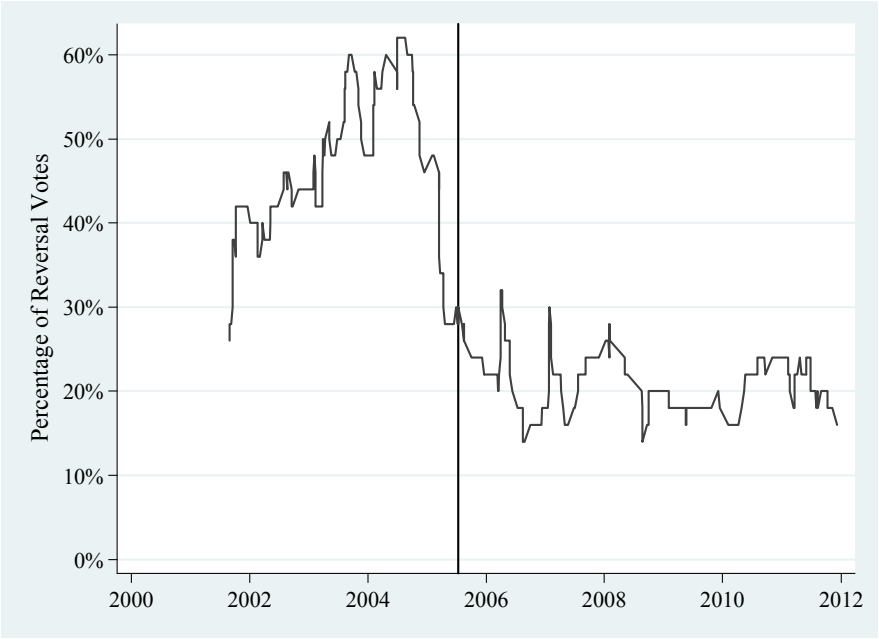
[286] *See* Wagner & Petherbridge, *supra* note 1, at 1111 n.19.

[287] Wagner and Petherbridge identify Judges Clevenger, Dyk, and Linn as "proceduralist" judges. *Id.* at 1153 n.161.

[288] Wagner & Petherbridge, *supra* note 11 (manuscript at 129) ("[T]he en banc *Phillips* opinion clearly suggests that the holistic approach is likely to be the better one . . . .").

[289] All of the holistic judges altered their reversal voting patterns significantly: Judge Bryson (-21.5%), Judge Lourie (-13.7%), and Judge Newman (-10.0%). *See* Wagner & Petherbridge, *supra* note 1, at 1153 n.161 (identifying Judges Bryson, Lourie, and Newman as "holistic" judges). Appendix B more fully depicts the changes in these judges' voting after *Phillips*.

FIGURE 9: JUDGE BRYSON'S REVERSAL PATTERN
(50 TERM ROLLING AVERAGE)



The proceduralist judges—Judges Dyk, Clevenger, and Linn—also exhibit a change in voting patterns after *Phillips*: Judges Dyk and Linn are two of the judges whose reversal rates changed most dramatically following *Phillips*, both falling by 21.1%.[290] Thus, *Phillips* affected both camps in a similar manner. Whatever doctrinal divides existed before *Phillips* likely continue to exist to this day. *Phillips* had a broad impact on the voting behavior of the court. We think that this impact is best explained through the emergence of a new, informal deference to district court decisions.

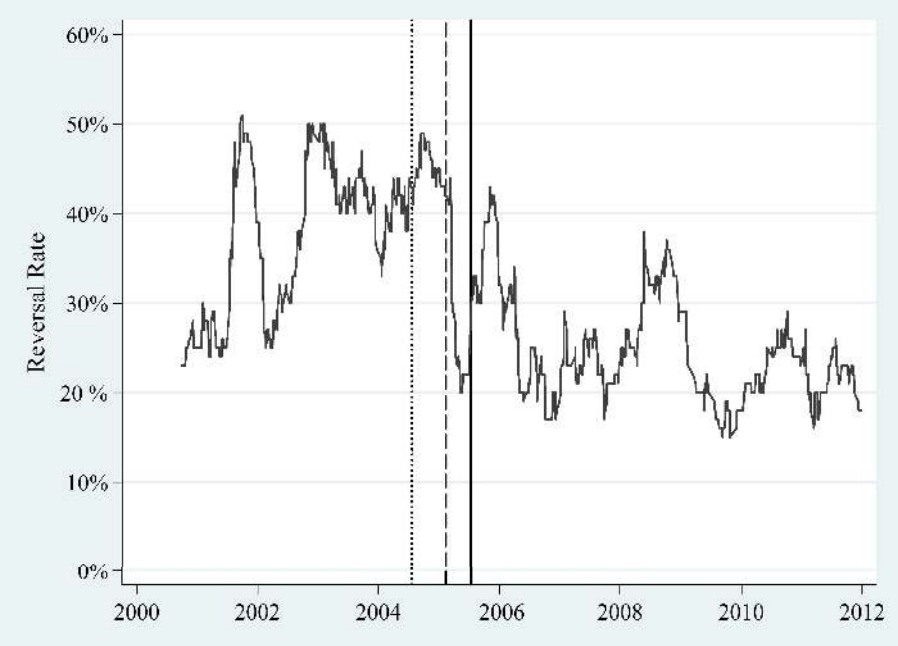
2. Deference.—We think the most likely explanation for the reduced reversal rate can be traced not to the majority opinion in *Phillips*, but rather to the dissent. Judge Mayer (joined by Judge Newman) did not take issue with the majority's decision in *Phillips*. Rather, he took issue with the court's de novo standard of review of claim construction. Judge Mayer contended that claim construction's status as an issue of law was to blame for the high reversal rate and that greater deference to district courts was appropriate.

[290] Judge Clevenger had a more modest reduction in his reversal rate (4.6%). It should be noted that Judge Clevenger took senior status shortly after *Phillips* and therefore ruled on significantly fewer terms in the post-*Phillips* period. *See* Appendix B.

Following *Phillips*, it appears that the judges on the Federal Circuit began to question the de novo standard. Indeed, we think that *Phillips* is best understood as the beginning of the era of "informal deference" for claim construction at the Federal Circuit. By informal deference, we mean some standard that is less rigorous than de novo review and which defers, on the margins, to district court determinations. By deferring to the decisions of district courts, the Federal Circuit has decreased its reversal rate of claim construction from a pre-*Phillips* high of 44% in 2004 to less than 20% in 2009.

The immediate drop in reversal rates following *Phillips* demonstrates a court that recognized the necessity of increased deference. As reflected in Figure 10, the reversal rate ticked up following grant of en banc review (dotted line), dropped significantly immediately following the oral argument in *Phillips* (dashed line), and after an increase following the issued opinion (solid line), the rate continued to drop. The court seems to have collectively recognized that the decision to review every opinion de novo had led to confusion and discontent.

FIGURE 10: REVERSAL RATE SHOWING CRITICAL DATES
(100 TERM ROLLING AVERAGE)



The increased use of the summary affirmance procedure also supports a shift toward informal deference. Employing Rule 36 allows the Federal Circuit to affirm the district court without having to provide its own

reasoning for the construction.[291] The rule may also provide cover for the appellate court to affirm close decisions, even if the court might have come out differently reviewing the law on its own.

Observation of the court reinforces our theory. *Cybor*'s de novo standard of review has long been controversial, even among Federal Circuit judges. A little over a year after the *Phillips* decision, a majority of the court expressed a desire to revisit *Cybor*.[292] Additionally, formal recognition of some sort of deferential review has begun to creep into the decisions of the court. Before retiring from the court, Chief Judge Michel's opinions began to frame the claim construction review process as something less than true de novo review. For example, in *Randall May International, Inc. v. DEG Music Products, Inc.*, after reciting the standard boilerplate language of standard of review,[293] Chief Judge Michel explained that "in reviewing a district court's claim construction, this court takes into account the views of the trial judge. Though we review those views and the record de novo, 'common sense dictates that the trial judge's view will carry weight.'"[294] This standard for review is explicitly deferential and thus something less than de novo.[295] Other judges have begun to frame the claim construction inquiry in this rather paradoxical fashion as well.[296] Several members of the Federal Circuit believe that the time is ripe to recognize the factual, evidentiary nature of the claim construction process. On several occasions, multiple members of the Federal Circuit have indicated their willingness to overrule *Cybor* in view of the factual nature of claim construction.[297] The grant of en banc review in *Lighting Ballast Control*

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[291] *See supra* note 220 and accompanying text.

[292] Amgen Inc. v. Hoechst Marion Roussel, Inc., 469 F.3d 1039, 1040 (Fed. Cir. 2006) (Michel, C.J., joined by Rader, J., dissenting from denial of rehearing en banc); *id.* at 1042 (Newman, J., dissenting from denial of rehearing en banc); *id.* at 1044 (Rader, J., dissenting from denial of rehearing en banc); *id.* at 1045 (Gajarsa, Linn & Dyk, JJ., concurring in denial of rehearing en banc) (concurring but stating willingness to consider the issue in a more appropriate case).

[293] 378 F. App'x 989, 996 (Fed. Cir. 2010).

[294] *Id.* (citation omitted) (quoting Nazomi Commc'ns, Inc. v. Arm Holdings, PLC, 403 F.3d 1364, 1371 (Fed. Cir. 2005)).

[295] Chief Judge Michel used nearly identical language in *Dow Jones & Co. v. Ablaise Ltd.*, 606 F.3d 1338, 1344–45 (Fed. Cir. 2010).

[296] Smith & Nephew, Inc. v. Arthrex, Inc., 502 F. App'x 945, 947 (Fed. Cir. 2013) (Lourie, J.) ("We address claim construction as a matter of law, which we review without formal deference on appeal, although we give respect to the conclusions and reasoning of the district court.").

[297] *See* Retractable Techs., Inc. v. Becton, Dickinson & Co., 659 F.3d 1369, 1370–73 (Fed. Cir. 2011) (Moore, J., joined by Rader, C.J., dissenting from denial of rehearing en banc) (noting that "[c]laim construction is the single most important event in the course of a patent litigation"; the concern expressed by commentators that claim construction appeals are "'panel dependent' which leads to frustrating and unpredictable results for both the litigants and the trial court"; and the Supreme Court's observation in *Markman* that claim construction is a "mongrel practice" and hence "is clearly a mixed question of law and fact and deference should be given to the factual parts"); *id.* at 1373 (O'Malley, J., dissenting from denial of rehearing en banc) (expressing a desire to overturn *Cybor*); Trading Techs. Int'l, Inc. v. eSpeed, Inc., 595 F.3d 1340, 1351 (Fed. Cir. 2010) (noting with irony in view of the factual

LLC v. Philips Electronics North America Corp.[298] indicates that the appellate standard pendulum is gaining momentum.

IV. TOWARD A COHERENT STANDARD OF APPELLATE CLAIM CONSTRUCTION REVIEW

By emphasizing the importance of claim construction and taking claim construction out of the jury's hands, the *Markman* case commenced a new era in patent litigation. The Supreme Court sought to leverage trial judges' comparative advantages in the "mongrel" practice of construing documentary evidence from the standpoint of skilled artisans. The Court also sought to illuminate the process of construing patent claims by taking this task out of the black box of jury deliberations. Unfortunately, the Federal Circuit's adherence to the view that claim construction is a pure question of law to which district courts' judgments are owed no deference has undercut trial judges' fact-finding role and the transparency of the claim construction process.

Our empirical analysis reveals that the Federal Circuit's en banc review of claim construction standards and procedures in the *Phillips* case was a turning point in the evolution of judicial review of claim construction decisions. The reversal rate dropped significantly shortly after the oral argument and has consistently remained well below pre-*Phillips* levels. The claim construction reversal rate of every member of the Federal Circuit has fallen since that time. However, there remains substantial variation among Federal Circuit judges in the degree of "deference" accorded lower court claim constructions. More recent cases, as illustrated by the dissents from rehearing the *Retractable Technologies* case en banc, confirm that the Federal Circuit remains divided over the appellate review standard for claim construction.

The drop in reversal rates since *Phillips* suggests that the Federal Circuit is currently more deferential to district court claim construction decisions than previously thought. The standards set forth in *Phillips*, however, do not provide a doctrinal basis for increased deference.

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nature of claim construction that "[t]his court's prior *en banc* decision requires a review of the district court's claim construction without the slightest iota of deference"); *Amgen*, 469 F.3d at 1041 (Michel, C.J., joined by Rader, J., dissenting from denial of rehearing en banc); Phillips v. AWH Corp., 415 F.3d 1303, 1330 (Fed. Cir. 2005) (en banc) (Lourie, J., joined by Newman, J., concurring in part and dissenting in part) (proposing that the Federal Circuit "ought to lean toward affirmance of a claim construction in the absence of a strong conviction of error"); *see also* Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1480–91 (Fed. Cir. 1998) (en banc) (Newman, J., joined by Mayer, C.J., additional views) (observing that "[t]he value of extrinsic evidence in claim interpretation is not surprising, because patent documents are written by and for persons in the field of the invention, not for judges"; although the patent and file history are the primary source of information concerning patent scope, "such documents are directed to persons knowledgeable in the field; additional evidence and expert testimony as to their meaning should be the rule, not the exception").

[298] 500 F. App'x 951 (Fed. Cir. 2013) (per curiam).

Although cutting back on the special role for dictionaries approved in the Federal Circuit's *Texas Digital* decision and affording district courts somewhat greater leeway to consider extrinsic evidence, *Phillips* retained the *Cybor* de novo review standard. If anything, the *Phillips* decision enhanced the Federal Circuit's scope of review by emphasizing the role of the specification in patent claim construction. Yet the claim construction reversal rate has unmistakably dropped. Thus, even though dozens of cases and academic articles have examined the proper deference standard, the proper standard remains elusive, even to members of the Federal Circuit.

Drawing upon jurisprudential foundations and functional criteria, we offer a coherent resolution to this puzzle. The problem derives from the ambiguity of "deference" as applied to the "mongrel" nature of claim construction. The jurisprudential basis for "deferring" to lower court claim constructions is not trial judges' policy expertise or experience vis-à-vis the Federal Circuit, but rather the inherently factual aspects of patent claim construction. The functional basis derives from adjudication-specific and systemic effects of different levels of deference to trial court claim construction determinations.

This Part begins by clarifying the jurisprudential basis of claim construction. It then examines the functional underpinnings of the standard of review for patent claim construction determinations. These sections provide the foundation for explicating the proper appellate review standard.

A. The Nature of Claim Construction

The starting point for assessing the proper standard for appellate review of patent claim construction rulings is examination of the nature of the inquiry. As the Supreme Court recognized in *Markman*, claim construction has long been a "mongrel practice."[299] The trial court must interpret claim terms from the standpoint of the skilled artisan within the context of the intrinsic record. Trial judges gain this perspective through extrinsic evidence which, when contested, requires subsidiary factual assessments such as the credibility of expert witnesses. Even though intrinsic evidence trumps contrary expert testimony, the interpretation of the intrinsic evidence itself must be conducted from the standpoint of the skilled artisan. While the Supreme Court established that the ultimate interpretation of a patent claim term is for the trial judge to render, the nature of the inquiry inherently involves factual determinations—how else can lay judges[300] stand in the shoes of skilled artisans?

At least since *Markman*, there has been a clear divide between district judges and a majority of the Federal Circuit over whether claim

[299] Markman v. Westview Instruments, Inc., 517 U.S. 370, 378 (1996).

[300] *See* Plager, *supra* note 5 (observing that "[m]ost district court judges do not have scientific training, and most have not chosen law clerks with technical or patent backgrounds").

construction entails fact-finding. All district court judges who have spoken to the issue see a significant role for fact-finding in deciphering the meaning of disputed patent claim terms from the standpoint of skilled artisans.[301] Federal Circuit Chief Judge Rader as well as Judges Newman, Moore, and O'Malley share the view that the Federal Circuit should apply a deferential standard of review, as did Chief Judges Mayer and Michel prior to their retirements from the court.[302] Furthermore, Judges Dyk, Gajarsa, and Linn have acknowledged that the Federal Circuit should defer to the district court on claim construction in at least those "atypical case[s] in which the language of the claims, the written description, and the prosecution history on their face did not resolve the question of claim interpretation, and the district court found it necessary to resolve conflicting expert evidence to interpret particular claim terms in the field of the art."[303]

Our empirical analysis indicates that a statistically significant de facto shift in the appellate standard has already occurred. This suggests that the disagreement over the standard of appellate review of claim construction rulings has evolved from a difference in kind (whether claim construction is a question of law or a mixed question) to a difference in degree (the extent to which fact-finding enters into claim construction determinations).

The Federal Circuit justifies de novo review, in part, on a passage taken out of context from the Supreme Court's *Markman* ruling. In *Markman*, the Supreme Court noted that its own "experience with document construction" left it "doubtful" that there would be many cases "in which a simple credibility judgment would suffice to choose between experts whose testimony was equally consistent with a patent's internal logic."[304] It then observed that "[i]n the main, we expect, any credibility determinations will be subsumed within the necessarily sophisticated analysis of the whole document, required by the standard construction rule that a term can be defined only in a way that comports with the instrument as a whole."[305] From this inference, the Court reasoned that the trial judge—possessing the "trained ability to evaluate the testimony in relation

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[301] *See, e.g.*, *Trading Techs. Int'l*, 595 F.3d at 1363–64 (Clark, District Judge (E.D. Tex.), concurring); Lucas Aerospace, Ltd. v. Unison Indus., L.P., 890 F. Supp. 329, 333–34 n.7 (D. Del. 1995) (Schwartz, J.); Elf Atochem N. Am., Inc. v. Libbey-Owens-Ford Co., 894 F. Supp. 844, 857 (D. Del. 1995) (McKelvie, J.); *In re* Mahurkar Double Lumen Hemodialysis Catheter Patent Litig., 831 F. Supp. 1354, 1359 (N.D. Ill. 1993) (Easterbrook, Circuit Judge (7th Cir.), sitting by designation), *aff'd*, 71 F.3d 1573 (Fed. Cir. 1995); Holderman, *supra* note 5, at 7, 14; O'Malley et al., *supra* note 8, at 680 (remarks of Judge O'Malley).

[302] *See supra* note 297.

[303] *See* Amgen Inc. v. Hoechst Marion Roussel, Inc, 469 F.3d 1039, 1045 (Fed. Cir. 2006) (Gajarsa, Linn & Dyk, JJ., concurring in the denial of rehearing en banc).

[304] *Markman*, 517 U.S. at 389.

[305] *Id.*

to the overall structure of the patent"[306]—"is in the better position to ascertain whether an expert's proposed definition fully comports with the specification and claims and so will preserve the patent's internal coherence. We accordingly think there is sufficient reason to treat construction of terms of art like many other responsibilities that we cede to a judge in the normal course of trial, notwithstanding its evidentiary underpinnings."[307]

In *Cybor*, the Federal Circuit read this passage to support its conclusion that claim construction is a question of law and hence subject to de novo review.[308] That interpretive leap, however, misapprehends the Supreme Court's evident intention when the full paragraph is considered. While the sentence noting that "any credibility determinations will be subsumed within the necessarily sophisticated analysis of the whole document" might be read in isolation to downplay the factual underpinnings of claim construction, the final sentence in the paragraph makes clear that the Supreme Court intended the opposite in analogizing to rulings that a trial judge routinely resolves during the course of trial, which are not subject to de novo review.[309] Thus, the more plausible interpretation of the full passage is that the Supreme Court is inclined toward a deferential standard of review of claim construction determinations reflecting the inherently "mongrel"—mixed fact and law—character of claim construction.

That the *Cybor* majority missed this subtlety is apparent in its suggestion that "[n]othing in the Supreme Court's opinion supports the view that the Court endorsed a silent, third option—that claim construction may involve subsidiary or underlying questions of fact."[310] In the accompanying footnote to this sentence, the *Cybor* majority reasons that "[i]f this were so, surely the Supreme Court would have discussed whether subsidiary or underlying fact questions should be decided by the judge or the jury."[311] Yet the Supreme Court's passage answers this suggestion. It analogizes the trial judge's "trained ability to evaluate the testimony in relation to the overall structure of the patent"[312] to the "many other responsibilities that we cede to a judge in the normal course of trial."[313] In so stating, the Supreme Court justifies leaving the entire claim construction

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306 *Id.* at 390.

307 *Id.*

308 Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc).

309 *See* Steven Alan Childress, *Standards of Review Primer: Federal Civil Appeals*, 229 F.R.D. 267, 289–91 (2005) (observing that "[c]ourts commonly recite the deferential 'abuse of discretion' test as broadly and generally appropriate on review of evidence calls").

310 *Cybor*, 138 F.3d at 1455.

311 *Id.* at 1455 n.4.

312 *Markman*, 517 U.S. at 390.

313 *Id.*

exercise in the trial judge's hands "notwithstanding its evidentiary underpinnings,"[314] i.e., its factual character. Following this logic, subsidiary factual issues in claim construction rulings, "like [the] many other responsibilities that we cede to a judge in the normal course of a trial,"[315] would be subject to a more deferential standard of review. In this way, the *Cybor* majority overlooked the potential for subsidiary factual questions—such as whether a patent claim term has special meaning to a skilled artisan.

The next section evaluates the standard of appellate review based on functional considerations—the type of inquiry that the Supreme Court applied in determining that claim construction is a matter for the court and not for the jury.

B. Functional Analysis of Appellate Review of Claim Construction

The standard of appellate review for claim construction determinations potentially affects several key aspects of the patent system. It is useful to distinguish between two levels of effects: (1) adjudication-specific effects—the quality, timing, and costs of patent litigation; and (2) larger systemic effects—predictability and consistency of patent boundaries.

1. Adjudication-Specific Effects.—At the adjudication-specific level, the standard of appellate review influences the incentives and choices of jurists and parties in patent litigation. The Federal Circuit's de novo review standard has had several deleterious effects on the quality, timing, and costs of patent litigation. By downplaying the factual nature of claim construction, the *Vitronics* and *Cybor* decisions discouraged district judges from considering expert witnesses in the manner that would be most productive.[316] Even though technical experts may lack the training and experience in interpreting documents, their perceptions about how to read a claim term in the context of the intrinsic evidence could shed valuable light on the ultimate interpretive question.[317] A court might also benefit from asking experienced patent drafters whether particular terms have accepted meaning within the claim drafting art or how the prosecution history

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[314] *Id.*

[315] *Id.*

[316] *See supra* notes 150–52, 160–65 and accompanying text.

[317] *Cf.* Trading Techs. Int'l, Inc. v. eSpeed, Inc., 595 F.3d 1340, 1350–51 (Fed. Cir. 2010) (Rader, C.J.) (noting that the Supreme Court observed in *Markman* that the "trial court occupies the best vantage point and possesses the best tools to resolve those evidentiary questions"); Amgen Inc. v. Hoechst Marion Roussel, Inc., 469 F.3d 1039, 1040–41 (Fed. Cir. 2006) (Michel, C.J., joined by Rader, J., dissenting from denial of rehearing en banc) ("[C]laim construction question[s] often cannot be answered without assessing, at least implicitly, what the average artisan knew and how she thought about the particular technology when the patent claims were written. To make such determinations, the trial judge necessarily relies upon prior art documents and other evidence concerning the skill of the ordinary artisan at the relevant time. Indeed, trial judges are arguably better equipped than appellate judges to make these factual determinations, especially in close cases.").

illuminates claim meaning.[318] As Professor Golden has argued, there is good reason to view at least some claim terms from the patent attorney-plus-artisan standpoint.[319] Our claim construction database reveals that many, if not most, of the disputed appealed terms are not purely technical terms but rather terms that are better understood from the standpoint of the skilled claim drafter. It is rare for courts to admit into evidence claim drafting custom and practice, yet that may well be the best source for construing some and possibly many patent claim terms.

Thus, the *Vitronics–Cybor* framework for claim construction has deprived the district court of critical evidence bearing on claim meaning. Furthermore, the emphasis on intrinsic evidence and the erroneous view that claim construction is a pure question of law has forced judges to spend countless hours reading and rereading the patent specification without the opportunity to fully and directly engage with those most familiar and conversant with the patent claim language in its technological, industrial, and claim drafting context. The de novo standard discourages trial judges from hearing experts debate a claim term's meaning and then using their experience to make credibility determinations to resolve the dispute.

The limited record from *Markman* proceedings in conjunction with the concern that touting extrinsic evidence is more likely to lead to reversible error distorts the trial courts' analysis and explication of their reasoning in reaching a particular claim construction. Some district judges have decided that it is better to provide little or no reasoning for their claim constructions[320]—possibly on the grounds that the Federal Circuit will be conducting their own analysis or possibly because anything that they

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[318] *Cf.* Edward D. Manzo, *How to Improve Patent Claim Interpretations*, 22 FED. CIR. B.J. 203, 207–09 (2012) (noting that patent law experts have traditionally been limited to describing Patent Office procedures, but suggesting a broader role in addressing claim drafting and prosecution practices).

[319] *See* Golden, *supra* note 91, at 383–85.

[320] *See, e.g.*, Hollingsworth & Vose Filtration Ltd. v. Delstar Techs., Inc., No. 10-788 GMS (D. Del. Jul. 10, 2012), *available at* http://www.scribd.com/doc/100456939/Hollingsworth-Vose-Filtration-Ltd-v-Delstar-Techs-Inc-C-A-No-10-788-GMS-D-Del-Jul-10-2012 (Order Construing the Terms of U.S. Pat. No. 6,623,548) (cursory opinion with no discussion of factual predicates, evidentiary sources, or explication of the claim construction process; footnotes limited to discussion of intrinsic sources and Federal Circuit jurisprudence); Shelbyzyme LLC v. Genzyme Corp., No. 09-768 GMS (D. Del. Jul. 8, 2011), *available at* http://www.delawareiplaw.com/2011/07/chief_judge_sleet_claim_constr.html (Order Construing the Terms of U.S. Pat. No. 7,011,831) (cursory opinion with a footnote summarizing Federal Circuit precedent emphasizing the primacy of intrinsic evidence and noting that "the parties presented conflicting extrinsic evidence . . . which the court will not consider"); *In re* Alfuzosin Hydrochloride Patent Litig., No. 08-md-1941 GMS (D. Del. May 20, 2009), *available at* http://www.delawareiplaw.com/2009/06/chief_judge_gregory_m_sleet_claim_construction_order.html (Order Construing the Terms of U.S. Patent No. 4,661,491) (cursory claim construction ruling with minimal explanation); *In re* Rembrandt Techs., LP Patent Litig., No. 07-md-1848 GMS, 2008 WL 5773604 (D. Del. 2008) (construing over 100 claim terms without setting forth any analysis in the claim construction order).

explain can and will be used against them in the U.S. Court of Appeals for the Federal Circuit.[321]

In addition to compromising the care and logic that comes from building a factual record and preparing a reasoned opinion, the de novo review regime undermines the appellate process. The parties, the public, and the appellate court lack the fully developed record and reasoned opinion that would enable them to get a transparent view of what occurred and to evaluate its correctness. Instead, de novo review substitutes an independent review of an anemic record—typically limited to the intrinsic evidence.

On the other side of the balance, the argument can be made that de novo review improves the quality of patent adjudication by providing independent analysis of a patent's metes and bounds by an experienced appellate tribunal. Yet that check is only as good as the record and the ability of the appellate jurists to evaluate the most pertinent evidence, both of which are contradicted by the foregoing analysis. Former Chief Judge Michel came to believe that de novo review "inundat[es]" the Federal Circuit "with the minutia of construing numerous disputed claim terms (in multiple claims and patents) in nearly every patent case" notwithstanding that trial judges often have a comparative advantage in mastering the full record and better understanding the skilled artisan's perspective.[322]

An argument can also be made that the Federal Circuit provides a potential check on inexperienced district court jurists or "renegade" districts.[323] Yet de novo review of claim construction rulings does not appear to be an effective tool for addressing these concerns. Empirical

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[321] *Cf.* Miranda v. Arizona, 384 U.S. 436, 469 (1966); *see also* Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1475 (Fed. Cir. 1998) (en banc) (Rader, J., dissenting in part, concurring in the judgment, and joining part IV of the en banc opinion) (suggesting that the de novo standard encourages trial judges to "disguise the real reasons for their interpretation").

[322] *Amgen*, 469 F.3d at 1040 (Michel, C.J., joined by Rader, J., dissenting from denial of rehearing en banc) (suggesting that de novo review "inundat[es]" the Federal Circuit "with the minutia of construing numerous disputed claim terms (in multiple claims and patents) in nearly every patent case"); *see also* Markman v. Westview Instruments, Inc., 52 F.3d 967, 999 (Fed. Cir. 1995) (en banc) (Newman, J., dissenting) (emphasizing the need for the trier of fact to "make[] findings that depend on the weight, credibility, and probative value of conflicting evidence" to determine how a person skilled in the art understands "technologic terms and words of art" used in patent claims), *aff'd*, 517 U.S. 370 (1996).

[323] *See* Donald R. Dunner, *A Retrospective of the Federal Circuit's First 25 Years*, 17 FED. CIR. B.J. 127, 130 (2008) (noting that the Eastern District of Texas is perceived as pro-patentee); Jeanne C. Fromer, *Patentography*, 85 N.Y.U. L. REV. 1444, 1462–65 (2010) (noting widespread forum shopping in district courts); Yan Leychkis, *Of Fire Ants and Claim Construction: An Empirical Study of the Meteoric Rise of the Eastern District of Texas as a Preeminent Forum for Patent Litigation*, 9 YALE J.L. & TECH. 193, 210–15 (2007) (arguing that juries in the Eastern District of Texas are plaintiff friendly); Kimberly A. Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, 79 N.C. L. REV. 889, 903–07 (2001). *But cf.* Xuan-Thao Nguyen, *Justice Scalia's "Renegade Jurisdiction": Lessons for Patent Law Reform*, 83 TUL. L. REV. 111, 136–43 (2008) (suggesting alternative explanations for the Eastern District of Texas's popularity as a patent venue).

research indicates that experienced jurists have fared no better than novices on claim construction appeals[324] and that the Eastern District of Texas—which has been a magnet for nonpracticing entity patent cases—has not fared worse than average on claim construction reversals.[325] Furthermore, other doctrines—such as venue[326]—are available to address concerns about districts seeking to attract patent cases. Shifting to a more deferential standard on claim construction would not eliminate judicial review altogether.

The private and social costs of the de novo standard of review at the adjudication-specific level manifest in various ways: lower quality decisionmaking at both the trial and appellate levels, higher costs of litigation as a result of more appeals and retrials following reversals, greater uncertainty regarding the litigation,[327] longer case pendency and litigation costs as a result of fewer and delayed settlements,[328] the distraction and disruption of litigation on the technology marketplace, and the added burdens on the judiciary and the judicial system.[329] Much of the

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[324] *See* Schwartz, *supra* note 6, at 279.

[325] As reflected in Appendix C, the Eastern District of Texas has experienced the lowest reversal rate among the most active patent districts over the 2000–2010 period.

[326] *See, e.g.*, *In re* Microsoft Corp., 630 F.3d 1361, 1362, 1365 (Fed. Cir. 2011) (per curiam) (ordering venue transfer where U.K. plaintiff incorporated affiliate and established office without employees in Tyler, Texas, sixteen days before filing suit there); *In re* Zimmer Holdings, Inc., 609 F.3d 1378, 1381 (Fed. Cir. 2010) (ordering transfer out of the Eastern District of Texas where "the plaintiff is attempting to game the system by artificially seeking to establish venue by sharing office space with another of the trial counsel's clients"); *In re* Hoffmann-La Roche Inc., 587 F.3d 1333, 1337–38 (Fed. Cir. 2009) (ordering transfer from Eastern District of Texas where plaintiff's only connection to transferring district was storing electronic documents locally); *In re* TS Tech USA Corp., 551 F.3d 1315, 1321 (Fed. Cir. 2008) (ordering venue transfer where "there [wa]s no relevant connection between the actions giving rise to this case and the Eastern District of Texas except that certain vehicles containing TS Tech's headrest assembly have been sold in the venue"). *See generally* MENELL, *supra* note 17, § 2.3.3.1 (discussing venue transfer motions).

[327] *See* Holderman, *supra* note 5, at 11 (listing the de novo standard of review in claim construction as among the factors contributing to the uncertainty of patent litigation).

[328] *See* Trading Techs. Int'l, Inc. v. eSpeed, Inc., 595 F.3d 1340, 1363 (Fed. Cir. 2010) (Clark, District Judge (E.D. Tex.), concurring) (suggesting that "the current *de novo* standard of review for claim construction may result in the unintended consequences of discouraging settlement, encouraging appeals, and, in some cases, multiplying the proceedings"); Amgen Inc. v. Hoechst Marion Roussel, Inc., 469 F.3d 1039, 1040 (Fed. Cir. 2006) (Michel, C.J., joined by Rader, J., dissenting from denial of rehearing en banc) (suggesting that de novo review "discourage[s] settlements"); Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1475–76 (Fed. Cir. 1998) (en banc) (Rader, J., dissenting in part, concurring in the judgment, and joining part IV of the en banc opinion) (suggesting that the de novo review standard would discourage and delay settlement).

[329] *See* Bowers v. Baystate Techs., Inc. 320 F.3d 1317, 1334 (Fed. Cir. 2003) (citing FED. R. CIV. P. 50) ("[A] change in the claim construction at the appellate level generally necessitates a remand to the district court to consider new factual issues unless the record on appeal supplies substantial evidence to support the jury verdict under the new claim construction."); Moore, *supra* note 1, at 2–3 (footnotes omitted) ("In the absence of a route for expedited appeal of claim construction, district courts are forced to proceed with lengthy and expensive patent litigation based on their frequently erroneous claim construction.").

cost—both private and social—derives from the discouraging effect of de novo review on early settlement of patent cases. As noted earlier, the costs of appellate review are relatively low in comparison to the costs of litigating a patent case through trial. Therefore, parties who lose at trial are far more likely to pursue an appeal under the de novo standard than they would be under a more deferential regime. This not only delays resolution, but also results in a substantial number of retrials. Overall, the de novo standard has raised the cost of patent litigation without any discernible benefits in terms of improved decisionmaking at the adjudication-specific level.

2. Systemic Effects.—The Federal Circuit based its de novo standard on promoting better notice, certainty, and national uniformity of patent boundaries.[330] The Federal Circuit's logic appears to be that as the national appellate patent court, the Federal Circuit is uniquely positioned to provide nationally uniform interpretations of patent boundaries. It is doubtful, however, that de novo review of claim construction rulings serves these goals due to structural and practical problems.

At the structural level, the Federal Circuit has limited authority to declare the boundaries of a patent beyond the parties in the suit.[331] The Federal Circuit's interpretation of a patent in one case cannot be asserted offensively by the patentee in a later infringement action against other defendants, although it can bar the patentee from seeking an alternative interpretation.[332] Because the patent system has no mechanism for conclusively establishing patent scope with regard to all potential infringers, the certainty that flows from appellate interpretations is not ironclad as subsequent defendants can potentially bring new evidence or more effective advocacy to bear on claim meaning. Thus, while de novo review increases the likelihood that the Federal Circuit will construe a patent in the same manner across cases, the limited benefits of that uniformity are outweighed by the drawbacks of refusing deference.[333] What

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[330] *See Cybor Corp.*, 138 F.3d at 1455 (noting that "treating interpretive issues as purely legal will promote (though not guarantee) intrajurisdictional certainty through the application of *stare decisis* on those questions not yet subject to interjurisdictional uniformity under the authority of the single appeals court" (emphasis omitted) (quoting Markman v. Westview Instruments, Inc., 517 U.S. 370, 391 (1996))); Markman v. Westview Instruments, Inc., 52 F.3d 967, 978 (Fed. Cir. 1995) (en banc) (grounding its view that claim construction is a matter of law on the principle that "it is only fair (and statutorily required) that competitors be able to ascertain to a reasonable degree the scope of the patentee's right to exclude"), *aff'd*, 517 U.S. 370.

[331] *See* Blonder-Tongue Labs., Inc. v. Univ. of Ill. Found., 402 U.S. 313, 317, 350 (1971).

[332] *See* MENELL, *supra* note 17, §§ 5.3.2.5, 5.3.3, 5.3.4 (discussing reasoned deference, judicial estoppel, and stare decisis as applied to claim construction rulings).

[333] *See* Kelly Casey Mullally, *Legal (Un)Certainty, Legal Process, and Patent Law*, 43 LOY. L.A. L. REV. 1109, 1149–50 (2010) (noting that de novo review "increases certainty by ensuring that each patent will be subject to a uniform claim construction" while decreasing certainty by making district court claim constructions more vulnerable to reversal).

our analysis shows is that achieving that goal through de novo review of patent claim construction misapprehends comparative institutional analysis at a heavy cost. Claim clarity can and should be handled through the claim indefiniteness doctrine[334] and through greater efforts by the Patent Office to ensure that patent claims are clear at the front end of patent protection.[335]

Furthermore, the Federal Circuit has overemphasized the role of intrinsic evidence in claim construction in its idealized, but flawed, view that patent claims should have a singular meaning to the public. Yet by failing to fully recognize that the "public" in the patent context means skilled artisans to whom trial judges have greater access, the Federal Circuit has substituted its own views of intrinsic evidence for the more subtle and multifaceted view that is possible at the trial court level. In so doing, it has distorted and supplanted the appropriate role for skilled artisans in the delineation of patent claim boundaries. As our empirical analysis indicates, the Federal Circuit's review of claim construction rarely addresses the skilled artisan perspective.[336] Thus, de novo review focused on often ambiguous intrinsic evidence produces an artificial sense of clarity and uniformity.

At a more practical level, the sheer number of patents (and patent claims) issued annually by the Patent Office[337] severely limits the Federal Circuit's ability to provide more than a thimble-sized solution to an ocean-sized challenge. The Federal Circuit is able to review a very small subset of the millions of patent claims granted each year, and this occurs only after years of litigation and typically hundreds of thousands or millions of dollars spent on litigation. There is little reason to believe that the Federal Circuit's arrogation of primacy over claim construction has done much if anything to promote greater certainty over patent claim boundaries.[338]

The Federal Circuit's desire to promote universal meaning and certainty is laudable, but misdirected. The nature of the patent system and due process considerations point toward a multi-institutional solution to achieving optimal notice. Relying on the Federal Circuit to operate as an effective "quiet title" institution misapprehends its fundamental characteristics and the challenge of promoting clear boundaries within a system that produces millions of intangible property "parcels" per year.

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334 "When a claim cannot be construed, it is indefinite, and therefore invalid." MENELL, *supra* note 17, § 5.2.4.2.

335 *See* Peter Menell, *It's Time to Make Vague Software Patents More Clear*, WIRED (Feb. 7, 2013, 4:10 PM), http://www.wired.com/opinion/2013/02/its-time-to-make-vague-software-patents-more-clear/.

336 *See supra* Part II.C.6.

337 *See* PATENT TECH. MONITORING TEAM, U.S. PATENT & TRADEMARK OFFICE, U.S. PATENTS STATISTICS CHART, CALENDAR YEARS 1963–2012 (noting 276,788 patent grants in 2012), *available at* http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm.

338 *See* Craig Allen Nard, *Process Considerations in the Age of* Markman *and Mantras*, 2001 U. ILL. L. REV. 355, 382 (observing that "de novo review delays certainty").

The Patent Office can and should play a more central role in achieving clear patent boundaries at the front end and developing taxonomies, search tools, and other mechanisms for reinvigorating the patent system's role in resource planning.[339] By contrast, the Federal Circuit should focus upon quality control of patent trial tribunals, bearing in mind their institutional limitations. Although this could occasionally produce incongruities in patent meaning across different lower courts, the costs of overlooking the inherently factual nature of patent claim construction—in terms of loss of transparency, litigation delays and costs, and discouragement of settlement—significantly outweigh the questionable uniformity benefits.

C. A Hybrid Appellate Review Standard

These jurisprudential and functional considerations support a standard of appellate review that depends primarily on the evidentiary basis of the claim construction determination and secondarily on a general balancing of accuracy and process costs in patent adjudication. The basis for "deferring" to lower court claim constructions is not trial judges' policy expertise or experience vis-à-vis the Federal Circuit but rather the inherently factual aspects of patent claim construction: tracing the origins of disputed terms, characterizing their basis (whether a claim term has special meaning to skilled artisans, claim drafters generally, or the particular patentee/prosecuting attorney or agent—i.e., the patentee is a lexicographer with respect to the claim term in question), and deciphering the meaning of the contested claim term from the perspective of a skilled artisan. As the Supreme Court has explained:

> The rationale for deference to the original finder of fact is not limited to the superiority of the trial judge's position to make determinations of credibility. The trial judge's major role is the determination of fact, and with experience in fulfilling that role comes expertise. Duplication of the trial judge's efforts in the court of appeals would very likely contribute only negligibly to the accuracy of fact determination at a huge cost in diversion of judicial resources. In addition, the parties to a case on appeal have already been forced to concentrate their energies and resources on persuading the trial judge that their account of the facts is the correct one; requiring them to persuade three more judges at the appellate level is requiring too much. As the Court has stated in a different context, the trial on the merits should be "the 'main event' . . . rather than a 'tryout on the road.'" For these reasons, review of factual findings

[339] *See* Peter S. Menell & Michael J. Meurer, *Notice Failure and Notice Externalities*, 5 J. Legal Analysis 1, 33–34, 36 (2013); Peter S. Menell, *Promoting Patent Claim Clarity* (Univ. of Cal. Berkeley Pub. Law, Research Paper No. 2171287, 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2171287.

> under the clearly-erroneous standard—with its deference to the trier of fact—is the rule, not the exception.[340]

Yet the interpretation of intrinsic evidence—like the interpretation of other documents, such as contracts and statutes—inclines toward de novo or independent review. Even here, however, the "mongrel" character of patent claim construction suggests a reviewing court should be cautious in overturning the district court's determination. Unlike a statute (which is viewed from a lay perspective),[341] the intrinsic evidence in a patent case is viewed from the standpoint of a skilled artisan. Thus, the proper standard of review must integrate deferential review of factual predicates with something approaching de novo review of documentary sources to achieve the ultimate appellate determination. We say "something approaching de novo review" for intrinsic evidence because even those documents must be viewed from the perspective of the skilled artisan, which the trial court is better positioned to perceive. Thus, like the claim construction determination itself, the appellate standard is distinctively "mongrel" in character.

The Federal Rules of Civil Procedure provide that "[f]indings of fact, whether based on oral or other evidence, must not be set aside unless clearly erroneous, and the reviewing court must give due regard to the trial court's opportunity to judge the witnesses' credibility."[342] Thus, the Federal Circuit must defer to trial judges' factual determinations in claim construction rulings. Since the patent document defines the invention, the Federal Circuit retains a substantial check on the overall claim construction determination through de novo authority over the intrinsic record and whether the trial court's factual finding inappropriately overrides more specific intrinsic indications of the patent's scope.

In practice, this proposed standard of review, consistent with the Supreme Court's *Markman* decision, will introduce a hybrid or sliding scale character to appellate review depending on the quality of the patent disclosure, nature of the disputed claim term (technical, common parlance, glossary), evidentiary record, and the rationale for the trial court's construction. Where the patent clearly defines the disputed term, there will be little or no role for fact-finding. But where the patent instrument is opaque, the specification does not address the term (as can occur with amended claims), or the term arguably diverges from common parlance, then the judge's resolution of conflicting testimony takes on much greater moment.

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[340] Anderson v. City of Bessemer City, N.C., 470 U.S. 564, 574–75 (1985) (omission in original) (quoting Wainwright v. Sykes, 433 U.S. 72, 90 (1977)).

[341] *See generally* William N. Eskridge, Jr. & Philip P. Frickey, *Statutory Interpretation as Practical Reasoning*, 42 STAN. L. REV. 321, 325–27 (1990) (discussing intentionalist interpretation).

[342] *See* FED. R. CIV. P. 52(a)(6); *Anderson*, 470 U.S. at 574–75.

Consequently, where the claim term is particularly susceptible to PHOSITA construction, the district court's ruling would carry great weight. But where the term is set forth or substantially constrained by the specification or prosecution history, then the intrinsic record would control. Even in this latter circumstance, however, we believe that the Federal Circuit should apply a heightened standard for reversal, such as a showing by the challenger of unambiguous evidence in the intrinsic record supporting an alternative construction. In general, this approach would be more deferential than de novo review, but also reflect fidelity to the intrinsic record where it provides unambiguous claim restrictions. Thus, trial courts' claim construction rulings should be upheld if not clearly erroneous or clearly contradicted by the specification or prosecution history.

This process would begin, as current claim construction practice does,[343] with the trial judge attempting to determine the plain and ordinary meaning of the patent claim terms within the context of the claim. The trial judge would then determine whether the claim term has particular meaning based on its usage in the technical art, its claim drafting convention, the patent specification, or some combination of these considerations. The more deferential standard of appellate review would invigorate trial courts' development of the factual record and place greater emphasis on skilled artisans, inventors, patent attorneys, and patent agents in tracing the drafting of patent claim terms and their understanding to skilled artisans in the context of the particular patent.[344] This could produce battles of the experts, but no more so than in other areas in which courts must view documents or other evidence from a specialized standpoint.

Over time, the district courts will likely better account for the fact–law distinction in their Patent Local Rules and *Markman* hearings. For example, courts could require litigants to more clearly set forth the intrinsic and extrinsic bases for claim construction, requiring a party seeking to bring forward expert testimony to disclose any gaps in the intrinsic record which skilled artisan testimony could fill. Furthermore, courts could innovate in the use of focused evidentiary hearings, possibly in conjunction with tutorials, for efficiently developing a factual record for claim construction.

It will be important for trial judges to incorporate into their analysis the overarching notice goal of the patent system—that patent claims should be understood objectively from the standpoint of skilled artisans unless the patent affords an unambiguous scope. As William C. Robinson explained

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[343] *See* MENELL, *supra* note 17, § 5.2.3.2.1.

[344] *See* Felix Frankfurter, *Some Reflections on the Reading of Statutes*, 47 COLUM. L. REV. 527, 536 (1947) ("If a statute is written for ordinary folk, it would be arbitrary not to assume that Congress intended its words to be read with the minds of ordinary men. If they are addressed to specialists, they must be read by judges with the minds of the specialists.").

more than a century ago, intrinsic evidence should play a critical role in claim construction, but courts should not be constrained in their resort to expert witnesses to assist them in reaching their interpretation.[345]

CONCLUSION

Since the resurgence of patent jury trials in the 1980s, the U.S. patent system has undergone a series of experiments aimed at improving the delineation of patent scope. While the Supreme Court's *Markman* decision usefully removed claim construction from the black box of jury deliberations, the Federal Circuit's efforts over the past sixteen years to guide claim construction have deeply frustrated the trial courts and failed to achieve transparent and effective results. In particular, the Federal Circuit's adherence to the view that claim construction is a pure question of law subject to de novo appellate review has distorted the evidentiary foundation of claim construction determinations, delayed settlement of patent cases, run up litigation costs, and turned appellate review of nearly every patent case into relitigation of patent claim terms.

As our empirical evidence reveals, the Federal Circuit has largely, but informally, renounced the de novo standard since its *Phillips* decision in 2005. Whereas in 2004 the court reversed 44% of the claim terms it reviewed, in 2011 it did so for only 20% of terms. In one sense, therefore, claim construction has become more predictable; a favorable construction at the trial level is much more likely to withstand appellate review. That certainty should lead to increased predictability and lower costs for parties engaged in litigation. The rise of informal deference is likely a case of the realities of judging outpacing the law—many judges on the Federal Circuit have expressed criticism of the de novo standard, but the court has yet to formally alter the standard.

This does not mean, however, that the problems of de novo review have been adequately resolved. The proper standard integrates fact-finding based on experts who can illuminate the perspective of skilled artisans and claim drafters with careful review of the intrinsic record. Lower courts' assessments of such evidence should be upheld if not clearly erroneous or clearly contradicted by the specification or prosecution history. The Federal Circuit should review the intrinsic record on a more independent basis, but with due regard for the district court's deliberations, proximity to the full record, and integration of the skilled artisan perspective. Were the Federal Circuit to embrace such a standard, lower courts would openly exercise their discretion to receive such evidence and build a forthright record supporting their interpretation. Such a hybrid appellate standard would foster better development of the basis for claim construction analysis while promoting earlier settlement of patent litigation and lower litigation cost.

[345] *See* ROBINSON, supra note 79, §§ 732–33.

Where the disputed claim term is particularly susceptible to skilled artisan construction, the district court's ruling would carry great weight. But where the term is set forth or substantially constrained by the specification or prosecution history, then the intrinsic record would control. But even in the latter circumstance, the Federal Circuit should apply a heightened standard—a showing by the appellant of unambiguous evidence in the intrinsic record supporting an alternative construction—so as to promote settlement and reduce litigation costs and uncertainty.

So long as the Federal Circuit clings to the view that claim construction is a question of law subject to de novo review, district courts will downplay their resort to experts and fact-finding in managing claim construction. So while informal deference may increase certainty and predictability, it undermines the quality of adjudication and appellate review by failing to elicit relevant evidence and by perpetuating opaque analysis and reasoning at the trial level. Thus, the time is ripe for the Federal Circuit (or the Supreme Court) to formally acknowledge the failure of the de novo experiment and articulate a more deferential standard that comports with the inherent nature of patent claim construction as a necessarily "mongrel"—mixed fact and law—practice.

APPENDIX A

Coding Methodology

An overinclusive search query was performed in order to locate the precedential and nonprecedential opinions dealing with claim construction. Once the opinions were collected, human coders read each case to determine relevancy.[346] Cases that were deemed initially relevant were then passed along to a team of coders. Because Rule 36 cases are summary affirmances, it is impossible to determine relevancy from the appellate order. Therefore, coders examined the appellate briefs to determine initial relevancy of those cases.

The "final disposition" code of each term (affirmed, reversed, avoided) serves as the basis for the reversal rates that appear throughout this Article. Avoidance of claim construction appeals often occurs when the Federal Circuit invalidates a patent (e.g., on obviousness grounds) and therefore does not reach other appealed issues that involve claim construction (e.g., infringement). Additionally, appeals arising from the United States Patent and Trademark Office were not included in the database because the USPTO's claim construction standard ("broadest reasonable interpretation") differs from that of the district courts.

For technological areas, we coded each term according to a classification system used in previous studies of technology patenting.[347] Because patented inventions often straddle the boundaries of multiple technology categories, we permitted coding of up to four technology areas for each claim term.[348]

For opinion cases (non-Rule 36 decisions), we collected "construction evidence"—data regarding the evidentiary sources referenced by the Federal Circuit in reaching its decision. This evidence relates to both the source of construction evidence (e.g., dictionaries) as well as the location of the evidence within the patent document (e.g., prosecution history). This information is not available for Rule 36 cases.

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[346] Relevancy was defined as any case in which the meaning of a claim term was challenged on appeal. Thus, certain cases were excluded from our database that involved issues of claim construction, but did not involve appellate review of claim construction decisions. Those cases include: (1) cases in which the district court's failure or refusal to construe a claim is challenged; (2) cases discussing formerly construed terms (either in separate cases or in a prior appeal of the case); (3) appeals of indefiniteness decisions; (4) appeals of prosecution history estoppel claims; (5) broadening reissue cases; (6) appeals of infringement or noninfringement that involve, but do not challenge, the meaning of claim language; and (7) doctrine of equivalents cases.

[347] *See* Allison & Lemley, *supra* note 272, at 2148 tbl.1. We used Allison and Lemley's system with one additional category: business methods.

[348] Coders were asked to code at least one and up to four relevant technology areas. Because many cases can be coded as multiple technologies (for instance, "mechanical" and "automobile-related"), the percentages of all the technologies will sum greater than 100%.

Coded Variables

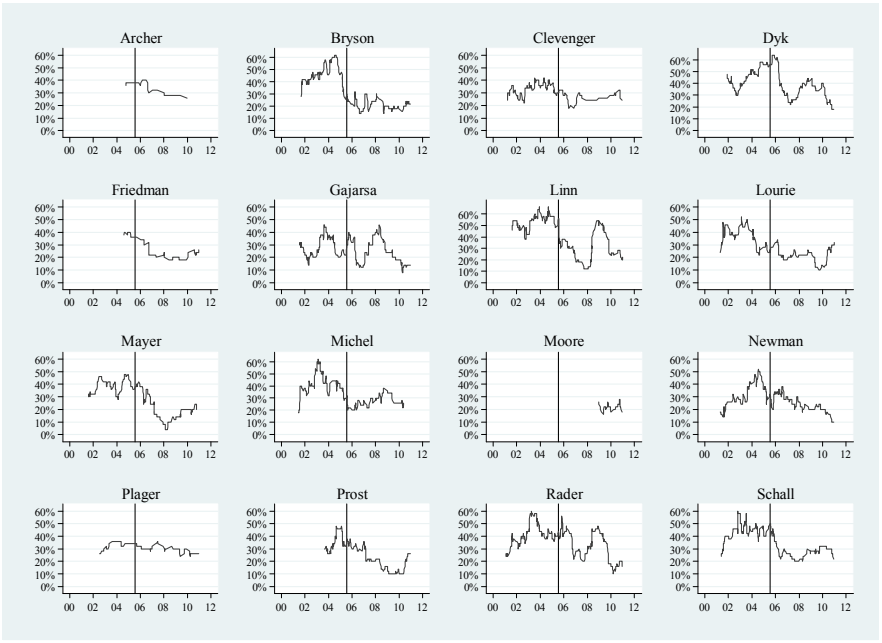
Variable	Coding
Lower Court	String
Decision Date	Date
Procedural Posture on Appeal	(1) Jury trial, (2) Bench trial, (3) Summary Judgment, (4) Mandamus, (5) Other
Federal Circuit Panel (Authoring Judge & Panel Members)	Judge Name
Federal Circuit Dissenting Judge (if any)[349]	Judge Name
Precedential Nature of Opinion	(1) Precedential, (2) Nonprecedential, (3) Rule 36
Final Disposition of Case on Appeal	(1) Affirm, (2) Reverse, (3) Reverse and Remand, (4) Vacate, (5) Vacate and Remand, (6) Other
Field of Technology of the patent (up to four)	(1) Mechanics, (2) Semiconductors, (3) Business Method, (4) Communications-Related, (5) Computer-Related, (6) Pharmaceuticals, (7) Automobile-Related, (8) Biotechnology, (9) Chemistry, (10) Electronics, (11) Medical Devices, (12) Energy-Related, (13) Optics, (14) Software, (15) Acoustics
Final Disposition of Claim Construction[350]	(1) Affirmed, (2) Reversed, (3) Avoided
Identify Person of Ordinary Skill (PHOSITA)	Y/N
Perspective of PHOSITA discussed?	Y/N
Intrinsic Evidence—Specification	Y/N
Intrinsic Evidence—Same Claim	Y/N
Intrinsic Evidence—Other Claims	Y/N
Intrinsic Evidence—Prosecution History	Y/N
Extrinsic Evidence—Expert Testimony/Tutorial	Y/N
Extrinsic Evidence—Dictionaries/Treatises	Y/N
Extrinsic Evidence—Other	Y/N

[349] We also coded for the relevance of the dissent to the claim construction issue appealed.

[350] Avoided cases were not included in the results for this Article.

APPENDIX B

Voting Patterns by Judge (50 Term Rolling Average)



APPENDIX C

Reversal Rates by District

District	**Pre-*Phillips* Reversal Rate (# of terms)**	**Post-*Phillips* Reversal Rate (# of terms)**	**Overall Reversal Rate (2000–2010)**
ITC	50.0% (24)	20.9% (43)	31.3% (67)
N.D. Cal.	34.7% (101)	13.1% (61)	26.5% (162)
C.D. Cal.	48.3% (58)	33.8% (65)	40.7% (123)
S.D.N.Y.	43.8% (48)	37.9% (29)	41.6% (77)
N.D. Ill.	25.0% (56)	29.5% (44)	27.0% (100)
E.D. Tex.	31.8% (22)	12.5% (48)	18.6% (70)
E.D. Va.	42.9% (42)	11.4% (35)	28.6% (77)
D. Mass.	22.9% (35)	40.0% (30)	30.8% (65)
D. Del.	40.0% (65)	17.6% (51)	30.2% (116)
D. Minn.	50.0% (30)	17.4% (23)	35.8% (53)
D.N.J.	44.0% (25)	22.2% (18)	34.9% (43)
W.D. Wis.	12.5% (16)	24.0% (25)	19.5% (41)

APPENDIX D

Regression Analysis[351]

Variable	Model 1 (Phillips Decision)
Phillips Decision Date (Before/After)	.744997 (.1183801)***
Mechanical Patent	-.2951718 (.1492575)*
Semiconductor Patent	-.5581067 (.2496073)*
Business Method Patent	-.9977604 (.2664371)***
Communications-Related Patent	.0239936 (.2025926)
Computer Patent	-.4713033 (.1625094)**
Pharmaceutical Patent	.5440078 (.2698196)*
Biotech Patent	-.5266175 (.2579594)*
Chemical Patent	-.4871186 (.1876407)**
Electrical Patent	-.2586631 (.146301)
Medical Device Patent	-.6095261 (.1752781)**
Energy-Related Patent	.7468069 (.508278)
Software Patent	.2441988 (.1940789)
Judge Michel	.3139206 (.2435436)
Judge Friedman	.3042246 (.3001979)
Judge Newman	.5820316 (.232259)*
Judge Mayer	.3819203 (.2411087)

[351] This Table reports a logistic regression model that predicts *Disposition_Term*—a variable that is positive when the Federal Circuit affirms the claim construction of the district court. The explanatory variables include: Phillips (a binary variable that is positive when a case occurs after the *Phillips* decision), technology categories (binary variables that are positive when a patent covers a particular field of technology), and Federal Circuit judges present on the panel (binary variables that are positive when particular judges appear on the panel). The values reported are odds ratios and (standard errors). Significance is indicated as follows:

(*), $p \leq .05$ (Significant at the .05 level)

(**), $p \leq .01$ (Significant at the .01 level)

(***), $p \leq .001$ (Significant at the .001 level)

$N = 1745$

Judge Plager	.3122942 (.2921773)
Judge Lourie	.2799947 (.2294993)
Judge Clevenger	.4470275 (.2430533)
Judge Rader	-.0845397 (.2316365)
Judge Schall	.1379078 (.2340243)
Judge Bryson	.220215 (.2348821)
Judge Gajarsa	.3402931 (.2296979)
Judge Linn	-.2966732 (.2301291)
Judge Dyk	-.2218544 (.2366453)
Judge Prost	.409444 (.2474897)*
Judge Moore	.1900034 (.2822021)