

The (Unnoticed) Revitalization of the Doctrine of Equivalents

Daryl Lim

Follow this and additional works at: <https://scholarship.law.stjohns.edu/lawreview>



Part of the [Intellectual Property Law Commons](#), and the [Supreme Court of the United States Commons](#)

This Article is brought to you for free and open access by the Journals at St. John's Law Scholarship Repository. It has been accepted for inclusion in St. John's Law Review by an authorized editor of St. John's Law Scholarship Repository. For more information, please contact selbyc@stjohns.edu.

THE (UNNOTICED) REVITALIZATION OF THE DOCTRINE OF EQUIVALENTS

DARYL LIM[†]

INTRODUCTION

Over the past century, few patent issues have been considered so often by the Supreme Court of the United States as the doctrine of equivalents (“DOE”).¹ This judge-made rule deals with a question that lies at the heart of patent policy—what is the best way to define property rights in an invention? The doctrine gives patentees an opportunity to ensnare an accused

[†] Professor of Law and Director, Center for IP, Information and Privacy Law, The University of Illinois at Chicago John Marshall Law School; Thomas Edison Innovation Fellow, George Mason University, Antonin Scalia Law School; Inaugural Microsoft Professorial Fellow, Fordham University School of Law, Hansen IP Institute. I am grateful to Jonathan Barnett, Sarah Biggs, Eric Claeys, Ewa Davison, John Duffy, Sandra Frantzen, Nicholas Groombridge, Genna Hibbs, Camilla Hrdy, Raizel Liebler, Alex Menchaca, Scott McBride, Adam Mossoff, Michael Risch, Josh Sarnoff, Ted Sichelman, Sam Wang, McAndrews Held & Malloy Ltd., participants of the 27th Annual Fordham IP Conference, and the George Mason Center for IP Protection (CPIP) 5th Summer Institute for sharing their valuable insights. Zhiwen “Jeannette” Jie provided valuable research assistance. All errors and omissions remain mine alone. This article was supported by a summer research grant from the Law School and by CPIP’s Thomas Edison Innovation Fellowship program. I am also grateful to the St. John’s Law Review, in particular, Rocco Recce, Kimberly Capuder, Matt Dean, and Sean Boren for their outstanding editorial assistance in bringing this article to print.

¹ See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co. (Festo II)*, 535 U.S. 722, 733 (2002) (“[E]quivalents remain a firmly entrenched part of the settled rights protected by the patent.”), *cert. denied*, 541 U.S. 988 (2004), and *aff’d*, 493 F.3d 1368 (Fed. Cir. 2007); *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 40 (1997) (“[W]e adhere to the doctrine of equivalents.”); *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950) (citation omitted) (“Originating almost a century ago in the case of *Winans v. Denmead*, [the doctrine of equivalents] has been consistently applied by this Court and the lower federal courts, and continues today ready and available for utilization when the proper circumstances for its application arise.”); Lee Petherbridge, *On the Decline of the Doctrine of Equivalents*, 31 CARDOZO L. REV. 1371, 1372 (2010) (“No doctrine invested in the Federal Circuit has produced more angst, controversy, or expense than the doctrine of equivalents.”). Only cases on patent eligibility have probably been considered more often. See *Alice Corp. Pty. v. CLS Bank Int’l*, 573 U.S. 208, 220–24 (2014) (summarizing precedent).

device that does not literally infringe a patent claim if the accused device is substantially similar to each claim limitation.² Patentees enjoy this advantage, but it comes at a cost to the public, who must face the uncertainty of whether claims actually mean what they say. This tension chafed the Justices and split the Court almost down the middle in two early cases.³ From those controversial beginnings to the present day, judges, practitioners, and academics continue to debate the doctrine's proper scope and continued vitality.⁴

In 2007, Professors Allison and Lemley declared in the *Stanford Law Review* that the doctrine, while once important, was dead based on their case data.⁵ Subsequent articles

² See *Festo II*, 535 U.S. at 727 (employing the doctrine to protect patentees from those seeking “to evade liability for infringement by making only insubstantial changes to a patented invention”); *Wi-Lan, Inc. v. Apple, Inc.*, 811 F.3d 455, 463 (Fed. Cir. 2016) (“Infringement under the doctrine of equivalents requires the patentee to prove that the accused device contains an equivalent for each limitation not literally satisfied.”).

³ See *Winans v. Denmead*, 56 U.S. 330, 344 (1853); *Graver Tank & Mfg. Co.*, 339 U.S. at 608.

⁴ See, e.g., Michael J. Meurer & Craig Allen Nard, *Invention, Refinement and Patent Claim Scope: A New Perspective on the Doctrine of Equivalents*, 93 GEO. L.J. 1947, 1948 (2005) (“Perhaps no doctrine in patent law is as controversial as the Doctrine of Equivalents . . .”); Doug Lichtman, *Substitutes for the Doctrine of Equivalents: A Response to Meurer and Nard*, 93 GEO. L.J. 2013, 2013–2014 (2005); see also John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955, 956–957 (2007) (noting that “[t]wo of the three most important Supreme Court patent cases decided between 1981 and 2005 concerned the scope of a limitation on the doctrine of equivalents . . . [with one] attracting more amicus briefs than any other Supreme Court patent case up to that date.”). For significant scholarship on the doctrine of equivalents, see generally: John F. Duffy, *The Festo Decision and the Return of the Supreme Court to the Bar of Patents*, 2002 SUP. CT. REV. 273 (2002); David L. Schwartz, *Explaining the Demise of the Doctrine of Equivalents*, 26 BERKELEY TECH. L.J. 1157 (2011); Martin J. Adelman & Gary L. Francione, *The Doctrine of Equivalents in Patent Law: Questions that Pennwalt Did Not Answer*, 137 U. PA. L. REV. 673 (1989); R. Polk Wagner, *Reconsidering Estoppel: Patent Administration and the Failure of Festo*, 151 U. PA. L. REV. 159 (2002); Matthew J. Conigliaro, Andrew C. Greenberg & Mark A. Lemley, *Foreseeability in Patent Law*, 16 BERKELEY TECH. L.J. 1045 (2001); Joshua D. Sarnoff, *Abolishing the Doctrine of Equivalents and Claiming the Future After Festo*, 19 BERKELEY TECH. L.J. 1157 (2004); Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839 (1990); S. Jay Plager, *Challenges for Intellectual Property Law in the Twenty-First Century: Indeterminacy and Other Problems*, 2001 U. ILL. L. REV. 69 (2001).

⁵ Allison & Lemley, *supra* note 4, at 967 (“The doctrine of equivalents is for all intents and purposes dead, and has been for years, even as lawyers and judges were seeing it as too expansive and struggling to cabin it.”).

published in 2010 and 2011 concurred.⁶ More recently, this appears to have changed. In a 2019 blog post titled *Doctrine of Equivalents is on Revival*, Professor Crouch reported on a Court of Appeals for the Federal Circuit decision finding for the patentee.⁷ Barely a month later, he reported on another Federal Circuit decision controversially declaring that “[t]he doctrine of equivalents applies only in exceptional cases,” and then hastily deleting the offending words “only in exceptional cases.”⁸

Is the doctrine truly on track for a revival? What does the Federal Circuit’s slip reveal about some of its judges’ views on cabining the doctrine? There has been unmistakably strong academic interest in this controversial doctrine over the years.⁹ These debates have intrinsic value; they serve to highlight the doctrine’s continued significance in both the academic literature and in the courts.¹⁰ They also question the central conclusion in

⁶ Petherbridge, *supra* note 1, at 1385–86 (“As a definitional matter, the doctrine is ‘in decline’ if there is a decrease in the average frequency of patentee success over time.”). *See also* Schwartz, *supra* note 4, at 1158 (“The doctrine of equivalents had been consistently applied by courts until its rapid ‘demise’ between the mid-1990s and the mid-2000s.”).

⁷ Dennis Crouch, *Doctrine of Equivalents is on Revival*, PATENTLY-O (Aug. 9, 2019), <https://patentlyo.com/patent/2019/08/doctrine-equivalents-revival.html> [<https://perma.cc/DXK9-SFYM>] (describing the decision as “yet another strong doctrine of equivalents decision”). *See also* *Eli Lilly & Co. v. Hospira, Inc.*, 933 F.3d 1320, 1336 (Fed. Cir. 2019) (reversing the lower court’s finding of literal infringement but affirming its finding of infringement under the doctrine of equivalents), *cert. denied*, 141 S. Ct. 112 (2020).

⁸ *Amgen Inc. v. Sandoz Inc.*, 923 F.3d 1023, 1029 (Fed. Cir.), *reh’g granted in part and denied in part per curiam*, 776 F. App’x 707, 707 (Fed. Cir. 2019). *See also* Dennis Crouch, “Exceptional Case” Rule Does Not Apply to Doctrine of Equivalents, PATENTLY-O (Sept. 3, 2019) [hereinafter Crouch, “Exceptional Case”], <https://patentlyo.com/patent/2019/09/exceptional-doctrine-equivalents.html> [<https://perma.cc/RDB6-ZMUR>] (noting that the court’s earlier statement was “a major step without precedential backing”). Professor Crouch continued:

It is possible that the court was simply intending to state that [doctrine of equivalents] is rare. The decision was so problematic though because “exceptional case” is a term of art used elsewhere in patent law and suggests creation of an additional test prior to allowing a patentee to rely upon [doctrine of equivalents].

Id.

⁹ *See supra* note 4 and accompanying text.

¹⁰ Timothy J. Douros, *Lending the Federal Circuit a Hand: An Economic Interpretation of the Doctrine of Equivalents*, 10 HIGH TECH. L.J. 321, 322 (1995) (“Nowhere in the patent law is such uniformity more needed than in application of the doctrine of equivalents.”); Petherbridge, *supra* note 1, at 1372–73 (“Highly visible internal disputes and outcry from the bar have been paralleled by Supreme Court review in some of the Court’s most famous patent cases of the modern era.”).

the Allison-Lemley study—that the doctrine of equivalents remains dead.

Drawing on independently curated data, this Article shows that the doctrine has not merely experienced a revitalization, but rather that it has evolved and penetrated industries that lie at the forefront of the nation's economy.¹¹ Corroborating evidence also suggests that the decline reported in the Allison-Lemley study may represent a slice of what appears to be a cyclical ebb in the vitality of the doctrine rather than a downward spiral.¹² Indeed, even with its pessimistic prognostication, the Allison-Lemley study acknowledged that patentees routinely invoked the doctrine of equivalents during the period under study.¹³ The revitalization this Article observes may foreshadow a continued increase in patentee wins with important ripple effects on parties' calculus of both settlement and licensing rates, with broader implications on the law on innovation that lie outside this Article's scope.¹⁴

This Article makes a second and equally important contribution to the literature: it unveils precisely how modern courts apply the doctrine of equivalents, which has important implications for both theory and practice. Doctrinally, every doctrine of equivalents decision is fact specific, eliding rote application of formulaic or mechanistic rules.¹⁵ Each case provides a piece—a datapoint—of the full puzzle. Only by stepping back to see how the pieces fit together can an evidence-

¹¹ See *infra* Section III.A.

¹² See *infra* Section III.A.

¹³ Allison & Lemley, *supra* note 4, at 977 (“[A] patentee is almost always arguing the doctrine of equivalents as an alternative to a theory of literal infringement.”); see also Kurt L. Glitzenstein, *A Normative and Positive Analysis of the Scope of the Doctrine of Equivalents*, 7 HARV. J.L. & TECH. 281, 290 (1994) (“The doctrine of equivalents is frequently raised, typically in the alternative to a charge of literal infringement, in patent infringement actions.”); Mircea Tipescu, *Future Trends on the Doctrine of Equivalents?*, LEXOLOGY (May 15, 2019), <https://www.lexology.com/library/detail.aspx?g=0d00b2b9-ac39-4a9a-85f8-4bbf36a2e5ef> [https://perma.cc/43ER-CAUU] (“Claims of infringement under the doctrine of equivalents routinely accompany literal infringement claims in patent infringement litigation.”).

¹⁴ Cf. Allison & Lemley, *supra* note 4, at 977–78.

¹⁵ *Id.* at 977 (“Doctrine of equivalents cases are quite fact-specific, and one explanation for the indifference of results to the legal standards is that judges are simply making a gut determination of whether the accused device is sufficiently similar to the patented invention.”); Jonathon Taylor Reavill, Note, *Tipping the Balance: Hilton Davis and the Shape of Equity in the Doctrine of Equivalents*, 38 WM. & MARY L. REV. 319, 329 (1996).

based response be provided to the questions and assertions of stakeholders. In practice, commentators have long bemoaned the poor performance of courts applying the doctrine.¹⁶ They stress the need for a better understanding and articulation of the doctrine, which would enable rivals to legitimately design around patents.¹⁷ If that quest for clarity fails, it creates a risk of unnecessarily chilling investment in research and development.¹⁸ An analysis of contemporary case data reveals the doctrine's data and evolution.

This Article tests conventional wisdom about the doctrine of equivalents against 351 Federal Circuit and district court cases decided between 2009 and 2019, including Federal Circuit Rule 36 summary affirmances with no opinion.¹⁹ The most recent empirical study conducted in 2009 picks up from an earlier study that concluded in 2008.²⁰ The 2009 study is also the most complete study. The 351 cases studied provided a total of 12,361 datapoints and addressed different issues that informed the conclusion of the doctrine's revitalization.

¹⁶ See Glitzenstein, *supra* note 13, at 309 (“[A]ny effort to reconcile the myriad decisions into a coherent vision is Sisyphean.”); see also Dennis Crouch, *Federal Circuit: “The Doctrine of Equivalents Applies ONLY in Exceptional Cases”*, PATENTLY-O (May 8, 2019), <https://patentlyo.com/patent/2019/05/doctrine-equivalents-exceptional.html> [<https://perma.cc/VG48-U2JU>] (disagreeing on whether the 2019 Federal Circuit case of *Amgen Inc. v. Sandoz Inc.* was “a major step without precedential backing” or was likely not intended to signal a new standard for the doctrine of equivalents).

¹⁷ Adelman & Francione, *supra* note 4, at 683; see also Allison & Lemley, *supra* note 4, at 956–57 (summarizing concerns that the doctrine “was swallowing the rule,” and “that it lack[ed] a coherent vision” (quoting Meurer & Nard, *supra* note 4, at 1949)).

¹⁸ Donald S. Chisum, *The Scope of Protection for Patents After the Supreme Court’s Warner-Jenkinson Decision: The Fair Protection—Certainty Conundrum*, 14 SANTA CLARA COMPUTER & HIGH TECH. L.J. 1, 6–7 (1998) (“There is clearly an interest in providing a clear definition of the scope of the patent right; lack of clarity can impede legitimate investment in technology-based products and services.”); see also James K. Folker, *A Legislative Proposal to Clarify and Simplify Patent Infringement Analysis Under the Doctrine of Equivalents*, 6 FED. CIR. B.J. 211, 233 (1996) (“Both the lack of predictability and the inadequate public notice resulting from the current state of doctrine of equivalents jurisprudence have a number of serious repercussions on individual patentees and their competitors which, when considered industry-wide, may hinder innovation in the country as a whole.”).

¹⁹ See Ryan T. Holte & Ted Sichelman, *Cycles of Obviousness*, 105 IOWA L. REV. 107, 136 & n.220 (2019) (indicating that Federal Circuit Rule 36 decisions provide confidence in the comprehensiveness of the dataset).

²⁰ Schwartz, *supra* note 4, at 1182 (reporting on a database of appellate decisions from 1991 to 2008).

Part I introduces the doctrine and underscores the dueling policies of fairness to the patentee and notice to the public that animate each case. It sets out tests that courts apply and the boundaries that those courts laid down to preserve the balance between fairness and notice.

Part II transitions the discussion into the empirical study that lies at the heart of this Article. It places this Article in the context of earlier studies and explains how its findings fill both temporal and substantive gaps in the literature. It also provides context for the discussion by identifying the variables presented in the dataset, elucidating on their significance, and setting out the boundaries of this Article's limitations.

Part III presents this Article's empirical findings on the vitality of the doctrine of equivalents and charts both its application and evolution. These findings show that patentees enjoy double the rate of success today than they did ten years ago and that the doctrine has evolved to feature in some of the most prominent industries in the modern economy. Specifically, patentees succeed on the merits in about one in five cases.²¹ Computer and communications-related inventions, as well as drug and medical device-related inventions, dominated the industry sectors; both overtaking mechanical inventions, which dominated just a few years before.²²

The doctrine has received considerable attention at the Federal Circuit, with large skews on relative influence and ideology toward the doctrine. Chief Judge Prost, Judge Lourie, and Judge Reyna made the most determinations in doctrine of equivalents cases. Based on frequency alone, these three may have been most influential among Federal Circuit judges in shaping our contemporary understanding of the doctrine of equivalents.²³ On the merits, Judge Linn, Judge Taranto, Judge Moore, and Judge Rader decided most often in favor of patentees. Judge Stoll, Judge Hughes, Judge O'Malley, Judge Bryson, and Judge Lourie decided most often in favor of alleged infringers. The data indicates Judge Lourie, who authored the corrected Federal Circuit opinion Professor Crouch reported on in 2019, as having an outsized role in shaping how we perceive the doctrine

²¹ See *infra* Section III.A.

²² See *infra* Section III.B.

²³ See *infra* Section III.C.

today and is one judge who is decidedly in favor of alleged infringers.²⁴

On the doctrinal front, courts today favor using the function-way-result test in operationalizing the doctrine of equivalents, though a significant number treat it interchangeably with the insubstantial differences test, with success rates that are lower than their counterparts in the Allison-Lemley study.²⁵ Surprisingly, most cases did not discuss limits to the doctrine of equivalents despite these being an easy way for alleged infringers to get themselves off the hook.²⁶ Where they did appear, prosecution history estoppel dominated, followed by the all-elements rule, the public dedication rule, and the prior art bar, with accused infringers succeeding most often in prosecution history estoppel cases.²⁷ As to the exceptions to prosecution history estoppel, tangentiality was most frequently raised, with unforeseeability a distant second and “some other reason” appearing in only one instance, with patentees succeeding most often with tangentiality.²⁸

On issues of interest to practitioners, most cases arose from the Third Circuit district courts, particularly from the District of Delaware, due to its popularity as the state of incorporation for many companies.²⁹ District courts in the Third Circuit, Seventh Circuit, and Ninth Circuit were most likely to find for patentees.³⁰ On appeal, the Federal Circuit affirmed most district court determinations regardless of the outcome below, with cases originating from the Second Circuit, Third Circuit, and Ninth Circuit leading the pack.³¹

Most cases saw accused infringers employing a strategy of seeking dismissals of infringement suits against them via summary judgment motions of non-infringement at the district courts with good success.³² Cases in which the parties were competitors dominated. When parties were rivals, courts found for patentees on the merits in about one in four cases, and when

²⁴ See *infra* Section III.C.

²⁵ See *infra* Section III.D.

²⁶ See *infra* Section III.D.

²⁷ See *infra* Section III.D.

²⁸ See *infra* Section III.D.

²⁹ See *infra* Section III.D.

³⁰ See *infra* Section III.D. Patentee district court win rates were as follows: Third Circuit (26%), Seventh Circuit (24%), and Tenth Circuit (33%).

³¹ See *infra* Section III.D.

³² See *infra* Section III.D.

parties were not rivals, courts found for patentees in about one in eight cases.³³ This Article concludes by highlighting key takeaways and identifying promising avenues for further research.

I. A PRIMER TO THE DOCTRINE OF EQUIVALENTS

This section sets out the doctrinal and policy context of the empirical study of this Article. Section A introduces the dueling policies animating every doctrine of equivalents case—on the one hand, fairness in providing adequate patent scope to the patentee, and on the other hand, fairness in providing adequate notice to the public. Section B describes how courts decipher the substance and nature of the invention. Section C explains how courts bridle the doctrine to achieve a balance between these dueling policies through the four judicial levers: prosecution history estoppel, the “all-elements” rule, the public dedication rule, and the prior art bar.

A. *Dueling Policies*

Patents encourage innovation by giving inventors of new and nonobvious technologies a right to control who makes, uses, and sells inventions embodying their patented technology.³⁴ Those rights are defined by patent claims, which courts liken to the “metes and bounds” of a real property deed.³⁵ Infringement occurs when someone uses a patentee’s inventive concept without permission. When this happens, a court may find the accused infringer guilty through literal infringement—reading the plain meaning of the patent claims.³⁶

Alternatively, courts may find the accused infringer infringed the patent claims by misappropriating the patentee’s

³³ See *infra* Section III.A.

³⁴ 35 U.S.C. § 271(a) (2010).

³⁵ See 35 U.S.C. § 112 (2012) (“The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.”); see also 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.”); *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989).

³⁶ Duffy, *supra* note 4, at 280 (“A patentee’s right to exclude others is normally defined by the literal language of the patent ‘claims’ . . .”).

inventive concept despite not infringing literally.³⁷ This doctrine “casts around a claim a penumbra which also must be avoided if there is to be no infringement.”³⁸ Professor Duffy observed that “it might accurately be described as the exception to the general rule that a patentee’s rights are defined by the literal language of the claim.”³⁹

In either case, attorneys drafting claims need to identify contingencies ahead of time and word their claims carefully to capture the broadest claim scope supported by the patent’s disclosure.⁴⁰ Yet even the most adroit attorney will fail to adequately capture everything because the fact is that words were made for things and not things for words.⁴¹ As the Supreme Court observed:

An invention exists most importantly as a tangible structure or a series of drawings. A verbal portrayal is usually an afterthought written to satisfy the requirements of patent law. This conversion of machine to words allows for unintended idea gaps which cannot be satisfactorily filled. Often the invention is novel and words do not exist to describe it. The dictionary does not always keep abreast of the inventor. It cannot. Things are not made for the sake of words, but words for things.⁴²

The doctrine of equivalents encourages patentees to innovate by protecting the substance of their claimed inventions,⁴³ while deterring infringers from appropriating inventions in cases where words may not adequately capture the essence of the invention.⁴⁴ To do otherwise would be to allow minor, inconsequential changes to misappropriate the fruits of the

³⁷ *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 41–42 (1929) (“There is a substantial identity, constituting infringement, where a device is a copy of the thing described by the patentee, ‘either without variation, or with such variations as are consistent with its being in substance the same thing.’” (quoting *Burr v. Duryee*, 68 U.S. 531, 573 (1863))).

³⁸ *Autogiro Co. of Am. v. United States*, 384 F.2d 391, 400 (Ct. Cl. 1967).

³⁹ Duffy, *supra* note 4, at 280.

⁴⁰ *Meurer & Nard*, *supra* note 4, at 1951–52.

⁴¹ Duffy, *supra* note 4, at 306 (“Unlike physical property, innovations occupy the realm of the conceptual and, as innovations, they are also new and nonobvious. The task for the law is thus to define accurately rights to incorporeal matters residing on the forefront of human knowledge.”).

⁴² *Autogiro Co.*, 384 F.2d at 397.

⁴³ See *Cabell v. Markham*, 148 F.2d 737, 739 (2d Cir.) (“[I]t is one of the surest indexes of a mature and developed jurisprudence not to make a fortress out of the dictionary . . .”), *aff’d*, 326 U.S. 404 (1945).

⁴⁴ 1 LESTER HORWITZ, ETHAN HORWITZ & LISA HERSHMAN, PATENT OFFICE RULES & PRACTICE § 111(A)(2)(a) (1992).

inventor's efforts.⁴⁵ On the other hand, rivals are entitled to compete with clear notice of what patent claims embrace so they can properly design around them.⁴⁶ All that is required is that the skilled person in the art can read claims to understand the scope of the patent and avoid infringement.⁴⁷

Ironically, the earliest American patents did not require claims. Instead, infringement focused entirely on the "essence" of the patented device through an inquiry into equivalents.⁴⁸ Patentees risked jurors—faced with the difficult task of divining how the invention worked—relying on superficial differences to conclude that the two inventions were dissimilar.⁴⁹ In 1836, Congress removed the task of "ascertaining the exact invention of the patentee by inference and conjecture" from the courts.⁵⁰ From then on, a patentee had to "particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery."⁵¹ Claims now allowed inventors to define their inventions in broad terms and assert their rights.⁵²

⁴⁵ See Chisum, *supra* note 18, at 7 ("[S]trict and literal adherence to the written claim in determining the scope of protection can invite subversion of a valuable right and substantially diminish the economic value of patents.").

⁴⁶ See Min-Chiuan Wang, *Nuisance Law and the Doctrine of Equivalents in Patent Law*, 34 SANTA CLARA HIGH TECH. L.J. 110, 146 (2018) ("[T]hese tests are all designed to determine whether the accused infringer took the use of the inventive concept of the patent in question. Purely taking the inventive concept of a patent without making a substantial change falls under 'moving along the Pareto frontier,' rather than 'shifting the frontier outward.'").

⁴⁷ *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (noting the "bedrock principle" of patent law that claims define the scope of a patent), *cert. denied*, 546 U.S. 1170 (2006).

⁴⁸ See Patent Act of 1790, ch. 7, § 2, 1 Stat. 109, 110 (repealed 1793); Patent Act of 1793, ch. 11, § 2, 1 Stat. 318, 318 (repealed 1836); see also *Odiorne v. Winkley*, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432); see also ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, *PATENT LAW AND POLICY: CASES AND MATERIALS* 711 (7th ed. 2017) (noting that "the exception to the modern rule—the doctrine of equivalents—is older than the rule itself").

⁴⁹ *Odiorne*, 18 F. Cas. at 582 (recognizing that this was "often a point of intrinsic difficulty"); see also Duffy, *supra* note 4, at 309 (discussing this difficulty).

⁵⁰ Patent Act of 1836, ch. 357, § 6, 5 Stat. 117 (1836); *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 278 (1877).

⁵¹ Ch. 357, § 6, 5 Stat. 117. The United States was first legal system to introduce claims. Now it is the norm. Other systems have come up with same function: purposive construction under English law. See, e.g., *Catnic Components Ltd. v. Hill & Smith Ltd.*, [1982] R.P.C. 183, 243; *Kirin-Amgen, Inc. v. Hoechst Marion Roussel Ltd.* [2004] UKHL 46, [30].

⁵² See *Carver v. Braintree Mfg. Co.*, 5 F. Cas. 235, 238 (C.C.D. Mass. 1843) (noting that claims helped the patentee to "guard[] himself against the suggestion, that his invention consists solely in a particular form . . . and [to] claim[] the invention to be his, whether the exact form is preserved, or not"); see also Duffy,

The Supreme Court initially used specifications to find the scope of an invention.⁵³ This would foreshadow a time when equivalents analysis would become the exception to claim interpretation fifteen years later.⁵⁴ Words inadequately describe the full range of an invention's points of novelty or fail to capture its nuances. Literalism, while efficient, is ineffective where it may well matter—when rivals make insubstantial changes to escape the literal wording of patent claims. In these instances, the doctrine of equivalents still allows patentees to ensnare them.⁵⁵

In any case, the Supreme Court has consistently been concerned that the doctrine, “when applied broadly, conflicts with the definitional and public-notice functions of the statutory claiming requirement.”⁵⁶ For instance, in his dissent in a seminal doctrine of equivalents case, *Graver Tank & Manufacturing Co.*, decided in 1950, Justice Black warned the doctrine would result in claims becoming “‘like a nose of wax, which may be turned and twisted in any direction . . . so as to make it include something more than, or something different from, what its words express.’”⁵⁷ A unanimous Supreme Court endorsed the doctrine nearly thirty years later in *Warner-Jenkinson Co.*, and cautioned that it “has taken on a life of its own, unbounded by the patent claims.”⁵⁸

Over the years, judges devised several ways to bind and bridle the doctrine. First, judges clarified that an equivalents analysis “must be applied to individual elements of the claim, not to the invention as a whole.”⁵⁹ Second, the patentee had to establish the reason for a prosecution-related amendment.⁶⁰ If

supra note 4, at 310 (“The claim was the friend of the patentee; it helped to expand patent rights.”).

⁵³ See *Winans v. Denmead*, 56 U.S. 330, 340 (1853); Duffy, *supra* note 4, at 311 (“[*Winans*] is now cited by the modern Supreme Court as the origin of the doctrine of equivalents.”).

⁵⁴ *Fay v. Cordesman*, 109 U.S. 408, 421 (1883) (“[Claims] must be regarded as material, leaving open only the question whether an omitted part is supplied by an equivalent device or instrumentality [in the accused product].”).

⁵⁵ See *Festo II*, 535 U.S. 722, 733 (2002), *cert. denied*, 541 U.S. 988 (2004), and *aff'd*, 493 F.3d 1368 (Fed. Cir. 2007).

⁵⁶ *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29 (1997).

⁵⁷ *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 614 (1950) (Black, J., dissenting) (quoting *White v. Dunbar*, 119 U.S. 47, 51 (1886)).

⁵⁸ *Warner-Jenkinson Co.*, 520 U.S. at 28–29.

⁵⁹ *Id.* at 29.

⁶⁰ See *id.* at 33.

the patentee could not, the court prohibited them from employing the doctrine for the amended portion of the claim.⁶¹ If the patentee succeeded in providing a reason, the court “would decide whether that reason is sufficient to overcome prosecution history estoppel as a bar to application of the doctrine of equivalents to the element added by that amendment.”⁶²

Third, by leveraging on claim interpretation being a question of law rather than one of fact, judges can hem the jury into a pen where the jury’s literal infringement deliberations fit snugly within the contours of judicially-determined reasonableness.⁶³ Fourth, the judge rather than the jury calls the balls and strikes when either party brings a motion for summary judgment, a motion for judgment as a matter of law (“JMOL”), or as we will see in Section II.C., through judicial limitations on the doctrine itself.⁶⁴ In every one of these three instances, judges must still employ one of two threshold tests, either individually or together.

B. Tests

“Insubstantiality” is the buzzword when it comes to equivalents. An element in an accused product is equivalent to a claim limitation if the differences between the two are “insubstantial” to one of ordinary skill in the art.⁶⁵ Judges generally treat insubstantiality as a question of whether the accused device “performs substantially the same function in substantially the same way to obtain the same result” as the

⁶¹ See *Festo II*, 535 U.S. 722, 737–38 (2002), *cert. denied*, 541 U.S. 988 (2004), and *aff'd*, 493 F.3d 1368 (Fed. Cir. 2007).

⁶² *Warner-Jenkinson Co.*, 520 U.S. at 33.

⁶³ See *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538 (Fed. Cir. 1991) (warning that it is “the exception, however, not the rule,” and not merely “the second prong of every infringement charge, regularly available to extend protection beyond the scope of the claims”); see also *Eli Lilly & Co. v. Hospira, Inc.*, 933 F.3d 1320, 1330 (Fed. Cir. 2019) (“Patent infringement is principally determined by examining whether the accused subject matter falls within the scope of the claims.”).

⁶⁴ See, e.g., *Festo II*, 535 U.S. at 737–41 (prosecution history estoppel); *Warner-Jenkinson Co.*, 520 U.S. at 39 n.8 (“[A] theory of equivalence [cannot] entirely vitiate a particular claim element”); *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608–09 (1950); *Johnson & Johnston Assocs. Inc. v. R.E. Serv. Co., Inc.*, 285 F.3d 1046, 1054 (Fed. Cir. 2002) (en banc) (subject matter disclosed but not claimed is dedicated to the public); *Wilson Sporting Goods Co. v. David Geoffrey & Assocs.*, 904 F.2d 677, 683 (Fed. Cir. 1990) (“[T]he asserted scope of equivalency [cannot] encompass the prior art.” (citations omitted)).

⁶⁵ *Warner-Jenkinson Co.*, 520 U.S. at 40.

claim limitation.⁶⁶ Here, courts assess if “an element in the accused device is equivalent to a claim limitation if it ‘performs substantially the same function in substantially the same way to obtain substantially the same result.’”⁶⁷

The “function-way-result” test demands a single result and a single function.⁶⁸ Sometimes each invention may produce many results and have many functions.⁶⁹ At other times, the “function” and the “result” may be essentially the same thing,⁷⁰ and “[b]ecause the accused infringers are often competitors of the patentees, the accused device and the patented device normally have the same function and result, and thus the determination normally turns on the ‘way’ component.”⁷¹ Moreover, the “function-way-result” test merely gives the purpose and goal of claim elements, but does not define the invention. The “way” an element operates only supplies “the means or mechanism by which it operates, but it does not reliably tell what the invention is [because that] is what structural terms in claims are for.”⁷²

When the Supreme Court introduced its “function-way-result” test for the doctrine of equivalents, the Court emphasized that the doctrine was not a “prisoner of a formula.”⁷³ So in 1997, the Court endorsed a second, “insubstantial differences” test, as an alternative while declining to choose one over the other.⁷⁴ The

⁶⁶ *Graver Tank & Mfg. Co.*, 339 U.S. at 608 (quoting *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929)); see also *W.L. Gore & Assocs. v. Medtronic, Inc.*, 874 F. Supp. 2d 526, 542 (E.D. Va. 2012), *aff'd*, 530 F. App'x 939 (Fed. Cir. 2013).

⁶⁷ *Voda v. Cordis Corp.*, 536 F.3d 1311, 1326 (Fed. Cir. 2008) (quoting *Schoell v. Regal Marine Indus., Inc.*, 247 F.3d 1202, 1209–10 (Fed. Cir. 2001)).

⁶⁸ See *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 1364 (Fed. Cir. 2000).

⁶⁹ *Glitzenstein*, *supra* note 13, at 306 (“An invention, however, typically produces myriad results and has many functions, whereas the tripartite test demands the isolation of a single result and a single function.”).

⁷⁰ See Donald R. Dunner & J. Michael Jakes, *The Equitable Doctrine of Equivalents*, 75 J. PAT. & TRADEMARK OFF. SOC'Y. 857, 863–64 & n.42 (1993).

⁷¹ *Folker*, *supra* note 18, at 228; see also *Perkin-Elmer Corp. v. Westinghouse Elec. Corp.*, 822 F.2d 1528, 1532 n.6 (Fed. Cir. 1987).

⁷² *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1546 (Fed. Cir. 1995) (Lourie, J., dissenting), *rev'd*, 520 U.S. 17 (1997).

⁷³ *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 609 (1950); see also *Festo II*, 535 U.S. 722, 727 (2002) (“[B]y extending protection beyond the literal terms in a patent the doctrine of equivalents can create substantial uncertainty about where the patent monopoly ends.”), *cert. denied*, 541 U.S. 988 (2004), and *aff'd*, 493 F.3d 1368 (Fed. Cir. 2007).

⁷⁴ *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 40 (1997) (“[T]he particular linguistic framework used is less important than whether the test is probative of the essential inquiry . . .”).

“insubstantial differences” test focuses on whether insubstantial change adds anything of significance “to the structure, material, or acts disclosed in” the relevant patent specification.⁷⁵ Judges sometimes expressly treat the two concepts as distinct and then proceed to apply both tests.⁷⁶ Others treat them coextensively.⁷⁷

The Supreme Court admitted that “the insubstantial differences test offers little additional guidance as to what might render any given difference ‘insubstantial.’”⁷⁸ Describing the “insubstantial differences test” as “elusive and frustrating,” commentators note that “the Federal Circuit has not, and probably will never, set out a definitive formula for determining whether an element of an accused device is a ‘substantial equivalent’ of a claim limitation pertaining to a claim element.”⁷⁹

In either case, patentees must provide particularized testimony and linking argument to that insubstantiality.⁸⁰ Patentees do so “through testimony of experts or others versed in the technology; by documents, including texts and treatises; and of course, by the disclosures of the prior art.”⁸¹ Patentees who pitch expert testimony at an abstract level, untethered to contemporaneous or supporting evidence, will see their claim for infringement short-lived.⁸² Conversely, defendants who admit that their minor changes do not add functionality to the invention, but who did so solely to design around the patented invention, may risk liability for infringement or dismissal of their

⁷⁵ *Valmont Indus., Inc. v. Reinke Mfg. Co., Inc.*, 983 F.2d 1039, 1043 (Fed. Cir. 1993).

⁷⁶ *See, e.g., Voda v. Cordis Corp.*, 536 F.3d 1311, 1326 (Fed. Cir. 2008) (describing “two articulations of the test for equivalence,” the function-way-result test and the insubstantial differences test).

⁷⁷ *See e.g., Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 631 F. Supp. 2d 1010, 1041–44 (N.D. Ill. 2009).

⁷⁸ *Warner-Jenkinson Co.*, 520 U.S. at 40.

⁷⁹ Sean T. Moorhead, Note, *The Doctrine of Equivalents: Rarely Actionable Non-Literal Infringement or the Second Prong of Patent Infringement Charges?*, 53 OHIO ST. L.J. 1421, 1433 (1992).

⁸⁰ *See, e.g., Texas Instruments, Inc. v. Cypress Semiconductor Corp.*, 90 F.3d 1558, 1567 (Fed. Cir. 1996) (“[A] patentee must still provide particularized testimony and linking argument as to the ‘insubstantiality of the differences’ between the claimed invention and the accused device or process, or with respect to the function, way, result test.”), *cert. denied*, 520 U.S. 1228 (1997).

⁸¹ *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 609 (1950).

⁸² *See TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1359–61 (Fed. Cir. 2019) (warning against relying on conclusory expert testimony).

motion for summary judgment of noninfringement.⁸³ As the next section shows, for patentees who succeed, the gauntlet that they must run continues as accused infringers may argue that one or more judicial limits apply to extinguish their claims under the doctrine of equivalents.

C. *Limits to Equivalents*

The courts have erected four bars to the doctrine of equivalents: prosecution history estoppel, the “all-elements” rule, the prior art bar, and the public dedication rule.⁸⁴ Each penalizes patentees “for sloppy or overly aggressive patent drafting and for strategic behaviors that shift the cost of information about the legal scope of an invention from an inventor to the Patent Office and the public.”⁸⁵ These limits complement the underlying factual question of infringement that a jury must answer. These bars also temper jury verdicts that threaten to upset the balance between the dueling policies of fairness to the patentee and notice to the public by improperly favoring the former over the latter.⁸⁶

1. Prosecution History Estoppel

Prosecution history is the public record of the correspondence between patent applicants and examiners during the prosecution process. Just as legislative history aids statutory interpretation, prosecution history illuminates the breadth of claims.⁸⁷ The estoppel usually arises when applicants narrow their claims in response to objections that the original wording is

⁸³ See, e.g., *Gemalto S.A. v. HTC Corp.*, 754 F.3d 1364, 1374–75 (Fed. Cir. 2014); see also *Cimline, Inc. v. Crafcro, Inc.*, 672 F. Supp. 2d 916, 929 (D. Minn. 2009), *rev'd on other grounds*, 413 F. App'x 240 (Fed. Cir. 2011).

⁸⁴ See generally MARTIN J. ADELMAN ET AL., CASES AND MATERIALS ON PATENT LAW § 12.4 (5th ed. 2019).

⁸⁵ Lee Petherbridge, *On the Development of Patent Law*, 43 LOY. L.A. L. REV. 893, 927 (2010).

⁸⁶ *EveryScape, Inc. v. Adobe Sys., Inc.*, 31 F. Supp. 3d 322, 325 (D. Mass. 2014) (“Ensnarement, like prosecution history estoppel, limits the scope of equivalency that a patentee is allowed to assert. This limitation is imposed even if a jury has found equivalence as to each claim element.”).

⁸⁷ See *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 987 (Fed. Cir. 1995) (comparing prosecution history to legislative history), *aff'd*, 517 U.S. 370 (1996); see also 37 C.F.R. § 1.11(a) (2012) (declaring that prosecution history becomes public post-issuance); Provisions for Claiming the Benefit of a Provisional Application With a Non-English Specification and Other Miscellaneous Matters, 70 Fed. Reg. 56119-02, 56119–20, 56126 (Sept. 26, 2005) (to be codified at 37 C.F.R. pt. 1).

not enabled or is unpatentable in view of the prior art, and broaden them later.⁸⁸ Accordingly, patentees who disclaim embodiments during the prosecution process cannot recover those embodiments at trial through the doctrine.⁸⁹ They, not the courts, bear the responsibility of negotiating claims that are broad enough to cover compositions that could be equivalent.⁹⁰

“Prosecution history estoppel can occur in two ways: ‘either (1) by making a narrowing amendment to the claim (“amendment-based estoppel”) or (2) by surrendering claim scope through argument to the patent examiner (“argument-based estoppel”)’ ” constituting “‘a clear and unmistakable surrender of subject matter.’ ”⁹¹ Applicants setting forth multiple reasons for distinguishing their invention from prior art may find each reason creating separate estoppels.⁹²

When the accused infringer prevails in raising prosecution history estoppel, the ball is in the patentee’s court and they must now explain to the court why estoppel should not in fact apply.⁹³ The Supreme Court in *Festo II* set out three exceptions to prosecution history estoppel.⁹⁴

First, when the alleged equivalent was already known at the time of the patent application filing, “one of ordinary skill in the art would not be on notice that the claimed invention relates to similar compounds that are known but not claimed.”⁹⁵ If the

⁸⁸ See *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1460 (Fed. Cir. 1998) (en banc) (illustrating how a narrowing argument leads to estoppel), *abrogated by* *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 904 F.3d 965 (Fed. Cir. 2018).

⁸⁹ See *Exhibit Supply Co. v. Ace Patents Corp.*, 315 U.S. 126, 137 (1942); Conigliaro, Greenberg & Lemley, *supra* note 4, at 1064–65 (explaining how prosecution history estoppel is “based on the equitable concept of an implied promise”).

⁹⁰ *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1425 (Fed. Cir. 1997) (“[A]s between the patentee who had a clear opportunity to negotiate broader claims but did not do so, and the public at large, it is the patentee who must bear the cost of its failure to seek protection for this foreseeable alteration of its claimed structure.”).

⁹¹ *Amgen Inc. v. Coherus BioSciences Inc.*, 931 F.3d 1154, 1159–60 (Fed. Cir. 2019) (quoting *Conoco, Inc. v. Energy & Env’t Int’l, L.C.*, 460 F.3d 1349, 1363–64 (Fed. Cir. 2006)).

⁹² *PODS, Inc. v. Porta Stor, Inc.*, 484 F.3d 1359, 1367 (Fed. Cir.), *cert. denied*, 552 U.S. 1022 (2007).

⁹³ *Festo II*, 535 U.S. 722, 741 (2002), *cert. denied*, 541 U.S. 988 (2004), and *aff’d*, 493 F.3d 1368 (Fed. Cir. 2007).

⁹⁴ *Id.* at 740–41.

⁹⁵ *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 631 F. Supp. 2d 1010, 1043 (N.D. Ill. 2009).

equivalent was foreseeable, a patentee should have claimed it.⁹⁶ In contrast, “one of ordinary skill in the art would be on notice that similar compounds discovered after the patent issued could infringe the patent in question because of the unforeseeability of the equivalent.”⁹⁷

The second way patentees can rebut the prosecution history is to show that the amendment bears little to no relationship to the asserted equivalent.⁹⁸ The inquiry focuses on the patentee’s “objectively apparent reason for the narrowing amendment.”⁹⁹ The patentee could not have voluntarily surrendered the equivalent if subject matter related to a different aspect of the invention.¹⁰⁰ Patentees therefore need to show the way that an alleged equivalent departs from what the claim limitation literally requires.¹⁰¹ Unfortunately, there is “still no consistent definition for when a narrowing amendment is tangential.”¹⁰²

The third and final way patentees can rebut prosecution history estoppel is to show that there is “some other reason” for narrowing the amendment.¹⁰³ The court explained that this

⁹⁶ See *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1425 (Fed. Cir. 1997) (“[No] subsequent change in the state of the art, such as later-developed technology, obfuscated the significance of [the] limitation at the time of its incorporation into the claim.”). *But see* *Ring & Pinion Serv. Inc. v. ARB Corp.*, 743 F.3d 831, 834 (Fed. Cir. 2014) (“There is not, nor has there ever been, a foreseeability limitation on the application of the doctrine of equivalents. It has long been clear that known interchangeability weighs in favor of finding infringement under the doctrine of equivalents.” (citing *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 36 (1997))).

⁹⁷ *Wm. Wrigley Jr. Co.*, 631 F. Supp. 2d at 1043.

⁹⁸ *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co. (Festo III)*, 344 F.3d 1359, 1369 (Fed. Cir. 2003).

⁹⁹ *Id.*

¹⁰⁰ See *Biagro W. Sales, Inc. v. Grow More, Inc.*, 423 F.3d 1296, 1306 (Fed. Cir. 2005).

¹⁰¹ See, e.g. *Insituform Techs., Inc. v. CAT Contracting, Inc.*, 385 F.3d 1360, 1362–63 (Fed. Cir. 2004) (addressing claims requiring single vacuum source placed near the resin when tangential source claims over a method of using a vacuum to impregnate flexible tube with resin originally rejected over a prior-art reference disclosing single vacuum source located far away from the resin source. The narrowing amendment distinguished the invention from the prior art based on the location of the vacuum source relative to the resin, not to limit the number of vacuum sources.).

¹⁰² Blaine Larson, *How Tangential Does It Have to Be?: Making Sense of Festo’s Tangential Limitations Doctrine*, 48 HOUS. L. REV. 959, 961 (2011); Nicholas Pumfrey et al., *The Doctrine of Equivalents in Various Patent Regimes—Does Anybody Have It Right?*, 11 YALE J.L. & TECH. 261, 268 (2009) (arguing the term “tangential” is “totally devoid of linguistic content as applied to patent law”).

¹⁰³ See generally Erin Conway, Note, *The Aftermath of Festo v. SMC: Is There “Some Other Reason” for Justifying the Third Festo Rebuttal Criterion?*, 82 CHI-

addressed “the shortcomings of language,”¹⁰⁴ which means that the equivalent could not be described with sufficient specificity in the claim. Thus, if the equivalent is present in the prior art, “‘there can be no other reason the patentee could not have described the substitute in question.’”¹⁰⁵ The court also noted that, similar to the tangentiality inquiry, “[w]hen at all possible, determination of the third rebuttal criterion should also be limited to the prosecution history record.”¹⁰⁶

2. The All-Elements Rule

The doctrine of equivalents is applied to each element of the claim and cannot eliminate an element.¹⁰⁷ The “all elements” rule requires judges to assess equivalents on a limitation-by-limitation basis rather than as a whole, and without reading any limitation completely out of the claim.¹⁰⁸ Factors “includ[e] the simplicity of the structure, the specificity and narrowness of the claim[s], and [like prosecution history estoppel] the foreseeability of variations at the time of filing the claim with the [Patent Office].”¹⁰⁹ If an accused device does not contain at least an equivalent for each limitation of the claim, there is no infringement because a required part of the claimed invention is missing. The “all-elements” rule thus works to prevent patentees from using the doctrine to broaden a claim element to vitiate the other claim elements.¹¹⁰

KENT L. REV. 1655, 1672–73, 1677–87 (2007) (analyzing the third *Festo VIII* criterion).

¹⁰⁴ *Festo III*, 344 F.3d 1359, 1370 (Fed. Cir. 2003).

¹⁰⁵ *Id.* (quoting *Pioneer Magnetics, Inc. v. Micro Linear Corp.*, 330 F.3d 1352, 1357 (Fed. Cir. 2003)).

¹⁰⁶ *Id.*; See Kurt Van Thomme, Note, *Prosecution History Estoppel After Festo: Can an Equivalent Ever Break Through the File Wrapper?*, 53 DRAKE L. REV. 1099, 1119 (2005) (“Unfortunately, this example is not particularly helpful, as it is essentially a restatement of its example of a foreseeable equivalent under the first analysis.”).

¹⁰⁷ *Abraxis Bioscience, Inc. v. Mayne Pharma (USA) Inc.*, 467 F.3d 1370, 1381–82 (Fed. Cir. 2006).

¹⁰⁸ *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1016–17 (Fed. Cir. 2006), *cert. denied*, 522 U.S. 940 (2007), and *aff'd*, 567 F.3d 1314 (Fed. Cir. 2009).

¹⁰⁹ *Freedman Seating Co. v. Am. Seating Co.*, 420 F.3d 1350, 1360 (Fed. Cir. 2005).

¹¹⁰ *Deere & Co. v. Bush Hog, LLC*, 703 F.3d 1349, 1356 (Fed. Cir. 2012) (“‘Vitiating’ is not an exception to the doctrine of equivalents, but instead a legal determination that ‘the evidence is such that no reasonable jury could determine two elements to be equivalent.’”) (quoting *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 39 n.8 (1997)).

At the same time, this inquiry is not “a ‘binary’ choice in which an element is either present or ‘not present’”; instead, courts “examine . . . whether there is a genuine factual issue that the accused device, while literally omitting a claim element, nonetheless incorporates an equivalent structure.”¹¹¹ Further, courts have employed the rule flexibly, focusing on the net effect of the interaction of the claim limitations rather than requiring each one to perform in the way prescribed by the patent claim.¹¹² The particularized analysis of the “all-elements” rule was meant to better serve the notice function.¹¹³ In practice, however, courts may have difficulty matching language and meaning. While the “all-elements” rule constrains the doctrine by requiring a mapping of elements, it does not prevent uncertainty springing from how courts choose to define the elements of a claim.¹¹⁴

3. The Prior Art Bar

Prior art limits what patentees can claim. Patentees cannot seek a range of equivalents “ensnar[ing] the prior art”; thus, if patentees could not have obtained a scope of claims from the Patent Office, then the doctrine of equivalents would not allow them to do so by a back door.¹¹⁵ The prior art bar applies regardless of whether a single piece of prior art anticipates the

¹¹¹ *Id.* at 1356–57.

¹¹² *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1259 (Fed. Cir. 1989) (recognizing that the doctrine can sometimes be assessed by the interplay among different elements).

¹¹³ *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. at 29–30. The notice function is served by the all-elements rule as follows:

Each element contained in a patent claim is deemed material to defining the scope of the patented invention, and thus the doctrine of equivalents must be applied to individual elements of the claim, not to the invention as a whole. It is important to ensure that the application of the doctrine, even as to an individual element, is not allowed such broad play as to effectively eliminate that element in its entirety. So long as the doctrine of equivalents does not encroach beyond the limits just described, or beyond related limits . . . we are confident that the doctrine will not vitiate the central functions of the patent claims themselves.

Id.

¹¹⁴ Matthew C. Phillips, *Taking a Step Beyond Maxwell to Tame the Doctrine of Equivalents*, 11 *FORDHAM INTELL. PROP., MEDIA & ENT. L.J.* 155, 162 (2000) (“The definition of an ‘element’ is slippery and probably cannot be settled without some resort to arbitrariness. Presently, an element seems to be more than just a single word, but potentially less than an entire step in a method or an entire constituent part of an apparatus . . .”).

¹¹⁵ *Wilson Sporting Goods Co. v. David Geoffrey & Assocs.*, 904 F.2d 677, 684–85 (Fed. Cir. 1990).

equivalent or if several pieces of prior art would together render that equivalent obvious.¹¹⁶

To determine whether the patent would ensnare the alleged equivalent, courts generally engage in the two-step hypothetical claim analysis. First, the judge must visualize a hypothetical patent claim sufficient to cover the accused product and determine if the U.S. Patent and Trademark Office would have allowed it over the prior art.¹¹⁷ Second, the accused infringer must produce evidence of prior art to challenge the hypothetical claim.¹¹⁸ If the hypothetical claim would be unpatentable for anticipation under 35 U.S.C. § 102 or obviousness under 35 U.S.C. § 103, then the accused device will be non-infringing.¹¹⁹

4. The Public Dedication Rule

The Federal Circuit articulated the public dedication rule in 2002.¹²⁰ This rule discourages patentees from filing broad disclosures and attempting to then circumvent examination by presenting only narrow claims.¹²¹ Patentees may disclaim equivalents by disclosing subject matter in the specification but declining to claim it, thereby “dedicat[ing] th[e] unclaimed subject matter to the public.”¹²² Like prosecution history estoppel, the public dedication rule protects public reliance on patentees who profess to surrender their patent scope during patent prosecution—either gratuitously or so that they would obtain the patents.¹²³ They cannot then expand their claims to cover it. Thus, if a patentee possessed a variation of the claimed invention, or if a skilled person in the art would understand that variation from the patent, then the patentee’s failure to claim it would cause it to fall into the public domain.¹²⁴

Disclosing generic references in a written specification does not mean “all members of that particular genus [become

¹¹⁶ *Key Mfg. Grp., Inc. v. Microdot, Inc.*, 925 F.2d 1444, 1449 (Fed. Cir. 1991) (three prior art references would make the accused product obvious).

¹¹⁷ *Wilson Sporting Goods Co.*, 904 F.2d at 684.

¹¹⁸ *Interactive Pictures Corp. v. Infinite Pictures, Inc.*, 274 F.3d 1371, 1380 (Fed. Cir. 2001), *cert. denied* 537 U.S. 825 (2002).

¹¹⁹ *Id.*

¹²⁰ *Johnson & Johnston Assocs. Inc. v. R.E. Serv. Co., Inc.*, 285 F.3d 1046, 1054 (Fed. Cir. 2002) (per curiam).

¹²¹ *Id.* at 1054–55.

¹²² *Id.* at 1054.

¹²³ *Petherbridge*, *supra* note 1, at 1375.

¹²⁴ *PSC Comput. Prods., Inc. v. Foxconn Int'l, Inc.*, 355 F.3d 1353, 1360 (Fed. Cir. 2004).

dedicated] to the public.”¹²⁵ “The disclosure must be of such specificity that one of ordinary skill in the art could identify the subject matter that had been disclosed and not claimed.”¹²⁶ Further, “before unclaimed subject matter is deemed to have been dedicated to the public, that unclaimed subject matter must have been identified by the patentee as an alternative to a claim limitation.”¹²⁷

II. THE EMPIRICAL STUDY

The doctrine’s controversy draws many commentators into its fold. Many commentators catalog developments in case law.¹²⁸ Others have employed law and economics,¹²⁹ mathematics,¹³⁰ and empirical methods.¹³¹ Earlier empirical studies examined factors leading to the doctrine’s decline.¹³² These studies are now between ten and twenty-eight years old, and their value in understanding the modern contours of contemporary case law diminished by time.¹³³ The earlier studies also omitted jury decisions, district court decisions, non-precedential decisions, and unreported decisions, creating gaps in their datasets.¹³⁴

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ *Pfizer, Inc. v. Teva Pharm. USA, Inc.*, 429 F.3d 1364, 1379 (Fed. Cir. 2005).

¹²⁸ Glitzenstein, *supra* note 13, at 309.

¹²⁹ Douros, *supra* note 10, at 324, 330–33.

¹³⁰ Raj S. Davé, *A Mathematical Approach to Claim Elements and the Doctrine of Equivalents*, 16 HARV. J.L. & TECH. 507, 529–57 (2003).

¹³¹ See Petherbridge, *supra* note 1, at 1380 (covering Federal Circuit decisions over a “fifteen-year period spanning January 1, 1992 to May 2, 2007”); see also Allison & Lemley, *supra* note 4, at 963 (covering “every district court and court of appeals decision on the doctrine of equivalents that appeared in Westlaw and was decided during three eighteen-month periods” between 1999 and 2005) (footnote omitted); Darcy August Paul, *The Judicial Doctrine of Equivalents*, 17 HARV. J.L. & TECH. 247, 248, 271–75 (2003) (covering the period between 1999 to 2002); Schwartz, *supra* note 4, at 1182–83 (examining cases between 1991 and 2008).

¹³² Schwartz, *supra* note 4, at 1158–59 (summarizing earlier studies either attributing the decline to trial courts displacing juries in construing patent claims or to the Supreme Court’s *Festo* decision reducing the doctrine’s applicability); see also *id.* at 1159 (attributing the decline to “‘doctrinal reallocation’ and ‘doctrinal displacement.’”).

¹³³ See *supra* note 131.

¹³⁴ See Allison & Lemley, *supra* note 4, at 963–64 (omitting jury decisions to focus on written decisions “to parse the grounds for decision and the reasoning of the opinions”); *id.* at 976 (published opinions were a “representative subset of all opinions”); Petherbridge, *supra* note 1, at 1378; see also Schwartz, *supra* note 4, at 1182–83 (focusing only on Federal Circuit cases); *id.* at 1186 (“[N]on-precedential opinions typically are not as well organized. . . . This presents potential coding difficulties.”).

A. *Literature Review*

This Article distinguishes itself from the prior work, and particularly past empirical studies. Those empirical studies looked at factors leading to a decline in the use of the doctrine of equivalents and the impact of precedent changes on the doctrine of equivalents.¹³⁵ This Article focuses on a different issue—finding meaningful answers through the rich data that case reports offer on the present vitality and scope of the doctrine, as well as win rates and court dynamics.

As mentioned, past empirical studies are outdated since they relied on cases decided between 1991 and 2008.¹³⁶ This Article presents contemporary data between 2009 and 2019. This approach allows an intertemporal comparison to be made on factors such as patentee win rates,¹³⁷ the success of specific doctrine of equivalents arguments,¹³⁸ and variations in industry representation and outcomes.¹³⁹ It also contrasts with aspects of the previous studies that relied on cases collected from discrete periods and used measures of differences in outcomes between periods to support its main hypothesis. By using a large data set without gaps, this Article can track the impact of important jurisprudential developments. This approach will also allow the results to validate or refute the conclusion in earlier studies that the doctrine of equivalents is in the decline due to the increased judicial use of claim construction to reach the same results.

B. *Study Design*

Empirical work aims to bring a more realistic, scientific understanding of the effects of law on legal actors and legal institutions. This Article employed case content analysis. This

¹³⁵ See Allison & Lemley, *supra* note 4, at 957 (“[A]n empirical study of every reported doctrine of equivalents decision in both the Federal Circuit and the district courts during three periods—one before the Federal Circuit’s 2000 *Festo* opinion, one after that opinion but before the Supreme Court’s 2002 opinion, and a third after the Supreme Court’s opinion.”).

¹³⁶ See *supra* note 131.

¹³⁷ See Allison & Lemley, *supra* note 4, at 966 (“By far the most dramatic finding of our study is that patentees rarely win doctrine of equivalents cases.”). The study reported that patentees won “only 24%” of decided cases over the eight-year period studied. *Id.*

¹³⁸ See *id.* at 974–75.

¹³⁹ See *id.* at 972–73 (noting that of 413 patent cases that featured the doctrine of equivalents, 61.7% pertained to mechanical devices, while 6.5% related to pharmaceuticals and finding little win-rate variation between industries).

well-established method is used by legal scholars to parse through judicial opinions to study how courts exercise discretion and judgment in applying legal rules to the facts in intellectual property cases.¹⁴⁰ A Westlaw search for the doctrine of equivalents returned 525 unfiltered decisions.¹⁴¹ A research assistant helped filter out decisions that mentioned the doctrine of equivalents without discussing it, returning with 351 cases. She analyzed each opinion and hand-coded the dataset, which was then reviewed, and the coding was checked for accuracy by two other reviewers.¹⁴²

The research assistant used a standardized set of coding instructions:

- (1) the decision's date;
- (2) the court where the case was decided;
- (3) the case citation;
- (4) whether the case repeated (to ensure cases were not counted more than once when a variable, such as venue, remains the same even as the number of claims warrant separate reporting);
- (5) the case's procedural posture;
- (6) the doctrinal test employed by the court, such as the function-way-result test;

¹⁴⁰ See Petherbridge, *supra* note 1, at 1380 (“Content analysis is capable of helping scholars verify, analyze, or refute empirical claims about case law, and it is to that purpose the approach is put in this study.”). For earlier studies where I employed a similar methodology, see, for example, Lee Petherbridge et al., *The Federal Circuit and Inequitable Conduct: An Empirical Assessment*, 84 S. CAL L. REV. 1293, 1303–04 (2011); Mark A. Hall & Ronald F. Wright, *Systematic Content Analysis of Judicial Opinions*, 96 CALIF. L. REV. 63, 77 (2008); DARYL LIM, PATENT MISUSE AND ANTITRUST LAW: EMPIRICAL, DOCTRINAL AND POLICY PERSPECTIVES 8–9 (2013); Daryl Lim, *Patent Misuse and Antitrust: Rebirth or False Dawn?*, 20 MICH. TELECOMM. & TECH. L. REV. 299, 303–04 (2014); Daryl Lim, *I Dissent: The Federal Circuit's “Great Dissenter,” Her Influence on the Patent Dialogue, and Why It Matters*, 19 VAND. J. ENT. & TECH. L. 873, 873, 911 (2017) [hereinafter Lim, *I Dissent*]; Daryl Lim, *Judging Equivalents*, SANTA CLARA HIGH TECH. L.J. 223, 223 (2020) [hereinafter Lim, *Judging Equivalents*] (reporting on, among other things, the judge-jury dynamic and the impact of “equitable triggers”).

¹⁴¹ See WESTLAW EDGE, <http://www.westlaw.com> (search in search bar for “adv:SY,DI(doctrine /3 equivalent)” with the date range from Jan. 1, 2009 to Dec. 31, 2019). There are other studies that also analyze Westlaw searches on the doctrine of equivalents. See, e.g., Allison & Lemley, *supra* note 4, at 963 (“[W]e collected every district court and court of appeals decision on the doctrine of equivalents that appeared in Westlaw . . .”).

¹⁴² See Holte & Sichelman, *supra* note 19, at 137 (describing a similar verification process with fifteen research assistants).

(7) the doctrinal limitations employed by the court, such as prosecution history estoppel;

(8) the limits to prosecution history estoppel, such as equivalents unforeseen at the time of claim amendment;

(9) the industry at issue;

(10) the level of the court (federal district court or circuit court);¹⁴³

(11) the outcome of the case, distinguishing between wins and losses on both the merits and procedure;

(12) the Federal Circuit judges deciding each opinion;

(13) the judicial circuit in which the district court heard the case;

(14) whether the opinion identified the parties as being rivals; and

(15) the outcome of a decision on appeal (where applicable).

Professors Allison and Lemley employed a similar case content analysis method to study doctrine of equivalents cases between 1999 and 2005.¹⁴⁴ The Allison-Lemley study provides useful points of comparison for this Article. Their data on win rates, posture, industry, and other variables allow this Article to make intertemporal inferences.¹⁴⁵ Like the Allison-Lemley study, this Article reported on all Federal Circuit and district court opinions.¹⁴⁶ At the same time, this Article adds new findings and analysis in several ways: (1) the dataset includes precedential and non-precedential cases, as well as Rule 36 cases; (2) it brings the study up to date, reporting on cases decided between January 1, 2009 and December 31, 2019;¹⁴⁷ (3) it includes judgements on a broader spectrum of procedural postures, eleven procedural postures from pretrial motions such as motions for summary judgment to full bench and jury trials, as well as judgment as a

¹⁴³ The Supreme Court did not decide on any doctrine of equivalents cases during the relevant period.

¹⁴⁴ Allison & Lemley, *supra* note 4, at 963.

¹⁴⁵ See *infra* Part III.

¹⁴⁶ Allison & Lemley, *supra* note 4, at 957 (“We have conducted an empirical study of every reported doctrine of equivalents decision in both the Federal Circuit and the district courts . . .”).

¹⁴⁷ My research assistant identified cases by headings in the opinions. Even when the analysis did not use a heading, if the opinion discussed the issue, we included the case in the database so long as there was a specific discussion in the opinion analyzing the relevant law or facts. Therefore, we excluded opinions with bare bones recitation of the doctrine.

matter of law (“JMOL”), up from seven,¹⁴⁸ and (4) it makes clear distinctions between outcomes from the Federal Circuit and district courts, between wins on procedure and wins on the merits, and between the tests applied.¹⁴⁹

C. *Limitations and Caveats*

Like all empirical studies, this one has its limitations and caveats. The main ones are as follows:

(1) Cases gleaned from legal databases, such as Westlaw, are known to underreport jury decisions.¹⁵⁰ However, given that the focus is on features of written decisions (including Rule 36 affirmances), the data remains valid as long as it is recognized to refer to a specific population rather than a sample of all cases in all possible worlds;

(2) Most cases settle, so decided cases are a nonrandom subset of all cases;¹⁵¹

(3) The complexity of patent litigation makes it difficult to generalize, from even a study covering hundreds of cases;¹⁵²

(4) Parties are not randomly distributed throughout the judicial districts. Venue selection is a significant feature in patent litigation.¹⁵³ Further, some district courts may hear more cases to amenable to settlement or be filed based on domicile. District court judges are therefore not assigned a random sample

¹⁴⁸ Allison & Lemley, *supra* note 4, at 980 tbl.1. The additional postures this Article looks to are: Summary judgment (Both the Patentee and Accused Infringer), Pleading on Doctrine of Equivalents (Patentee), Declaratory judgment (Accused Infringer), and Rule 11.

¹⁴⁹ For instance, the Allison-Lemley study categorizes the “all elements rule” together with the “function-way-result” test and the “insubstantial differences” test. *Id.* at 964.

¹⁵⁰ *Id.* at 963–64 (“The universe of all decisions is of course different from the universe of those reported in Westlaw, and in particular our study underreports jury decisions. But our focus on written decisions (both reported and unreported) allows us to parse the grounds for decision and the reasoning of the opinions.”).

¹⁵¹ 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, 273–74 (2006) (finding that between 65% and 68% of all patent cases filed in three particular years were resolved via settlement or a probable settlement).

¹⁵² See Schwartz, *supra* note 4, at 1188 (“Because patent litigation as a whole is so complex, it is incredibly complicated to develop and test empirical models.”); Petherbridge, *supra* note 1, at 1380 (noting biases inherent in this approach such as “unobserved reasoning, selection bias, and strategic behavior”); see also Allison & Lemley, *supra* note 4, at 966.

¹⁵³ Kimberly A. Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, 79 N.C. L. REV. 889, 924–31 (2001).

of patent lawsuits, since they are assigned cases from the judicial district where they sit,¹⁵⁴

(5) Circumstances such as a particular judge or jury may cause a case to settle where the same case before another judge or jury could proceed to an appeal,¹⁵⁵

(6) Content analysis of judicial opinions has well-known limitations within the methodology itself.¹⁵⁶ Statistics fail to account for extralegal factors influencing judging such as summary affirmances, the state of the case record on appeal, judicial deliberations the opinion;¹⁵⁷

(7) This Article focuses on how Federal Circuit and lower courts interpret precedent. Those interpretations are not uniform and never can be,¹⁵⁸

(8) Coding by any one person may result in incomplete or inaccurate coding, despite cross-coding and verification using a population sample;

(9) This Article does not directly discuss central claiming or peripheral claiming, both of which rely on the doctrine of equivalents.¹⁵⁹ While doctrinally rich, these types of claiming do not directly relate to the empirical study;

¹⁵⁴ Schwartz, *infra* note 160, at 241–42.

¹⁵⁵ Eric Herman, *Charting the Yays and Nays in Federal Court*, CHI. LAW., Mar. 1996, at 10 (“[I]f [judges] have a really tough case, they can put tremendous pressure on the parties to settle so there won’t be an appealable order.” (quoting Judge Richard A. Posner)).

¹⁵⁶ See R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1128–29 (2004) (discussing unobserved reasoning, strategic behavior, and selection bias).

¹⁵⁷ Harry T. Edwards & Michael A. Livermore, *Pitfalls of Empirical Studies That Attempt to Understand the Factors Affecting Appellate Decisionmaking*, 58 DUKE L.J. 1895, 1899 (2009); see also Holte & Sichelman, *supra* note 19, at 160 (“Data is incomplete and never fully accurate, methodologies can never fully control for every potential external factor that could explain results.”).

¹⁵⁸ See Jeffrey J. Rachlinski, *Does Empirical Evidence on the Civil Justice System Produce or Resolve Conflict?*, 65 DEPAUL L. REV. 635, 636 (2016) (“[E]ven when the empirical scholars completely agree on the underlying facts, interpretation of the results can dramatically differ. Empirical legal scholarship is still worth conducting, but the hope that it will resolve partisan debates in law is unrealistic.”).

¹⁵⁹ John F. Duffy, *Counterproductive Notice in Literalistic Versus Peripheral Claiming*, 96 B.U. L. REV. 1197, 1203 (2016) (citing Henry E. Smith, *Intellectual Property as Property: Delineating Entitlements in Information*, 116 YALE L.J. 1742, 1807 (2007)) (“[M]odern commentators repeatedly make the historical mistake of asserting that the doctrine of equivalents is a remnant of the central claiming system. It is not. Both central claiming and peripheral claiming, as traditionally practiced, rely heavily on the doctrine of equivalents.”).

(10) The reported data is kept to whole numbers without decimal places, following convention used in other empirical studies.¹⁶⁰ Variables with less than five counts were omitted;

(11) Most cases do not distinguish between amendment-based estoppel and argument-based estoppel in prosecution history estoppel cases. Neither does the dataset;¹⁶¹ and

(12) Litigants may consider the expertise and reputation of the district court judge in deciding whether to appeal, introducing selection bias effects into the appellate data.¹⁶²

A statistics post-doctoral fellow from the University of Chicago conducted a statistical analysis of the data. The Fisher Exact Test for contingency tables was used to test the null hypothesis that a case attribute is independent of case outcome.¹⁶³ This contingency table approach is more appropriate than regression because the outcomes and attributes are all categorical variables; furthermore, a Fisher Exact Test is more appropriate than a chi-squared test because many of the cells have expected counts less than five.

Since the outcome of interest and all attributes, except for “Rival,” have more than two categories, calculating exact p-values can be computationally difficult, so we calculate Monte

¹⁶⁰ See, e.g., Ted Sichelman, *Myths of (Un)certainly at the Federal Circuit*, 43 LOY. L.A. L. REV. 1161, 1175 (2010); Holte & Sichelman, *supra* note 19, at 158; see also TJ Cole, *Too Many Digits: The Presentation of Numerical Data*, 100 ARCHIVES DISEASE CHILDHOOD 608, 609 (2015), <https://adc.bmj.com/content/archdischild/100/7/608.full.pdf> [<https://perma.cc/J2XN-ZAJD>] (“The general principle is to use two or three significant digits for effect sizes, and one or two significant digits for measures of variability.”). The approach is by no means universal. Other scholars present their data to one decimal place. See, e.g., Allison & Lemley, *supra* note 4, at 971; David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 249 (2008) (keeping to one decimal place).

¹⁶¹ For a list of cases in the dataset discussing one or both these forms of estoppel, see generally *Pharma Tech Sols. Inc. v. LifeScan, Inc.*, 942 F.3d 1372 (Fed. Cir. 2019); *Intendis GMBH v. Glenmark Pharm. Inc., USA*, 822 F.3d 1355 (Fed. Cir. 2016); *Medtronic Navigation, Inc. v. BrainLAB Medizinische Computersysteme GmbH*, 603 F.3d 943 (Fed. Cir. 2010); *Pharma Tech Sols. Inc. v. LifeScan Inc.*, 348 F. Supp. 3d 1076 (D. Nev. 2018); *Alfred E. Mann Found. for Sci. Research v. Cochlear Corp.*, 96 F. Supp. 3d 1028 (C.D. Cal. 2015); *Paone v. Microsoft Corp.*, 881 F. Supp. 2d 386 (E.D.N.Y. 2012); *LG Elecs. U.S.A., Inc. v. Whirlpool Corp.*, 798 F. Supp. 2d 541 (D. Del. 2011); *Zircon Corp. v. Stanley Works*, 713 F. Supp. 2d 881 (N.D. Cal. 2010); *MarcTec, LLC v. Johnson & Johnson*, 638 F. Supp. 2d 987 (S.D. Ill. 2009).

¹⁶² Schwartz, *supra* note 160, at 243.

¹⁶³ Daryl Lim, PE Dataset (Jan. 19, 2021) (unpublished dataset) (on file with author).

Carlo p-values with 50,000 samples.¹⁶⁴ When performing a hypothesis test, a smaller p-value is indicative of stronger evidence against the null hypothesis, and typically a p-value below .05 is considered statistically significant evidence against the null hypothesis. However, we performed eight hypothesis tests (one for each attribute), so using a Bonferroni procedure to control false positives would suggest a cutoff of $.05 / 8 = .00625$.¹⁶⁵

The number of data points in this instance is naturally limited by the cases which have been argued and the fact that the null hypothesis of independence is not rejected for all but the posture attribute may be due to the small sample size. However, the descriptive charts nonetheless speak for themselves, and the data is still informative.

III. THE VITALITY OF THE DOCTRINE OF EQUIVALENTS

Section A presents contemporary, empirical evidence proving that the Allison-Lemley study's earlier report of the doctrine of equivalent's demise is not true today. Not only are patentees succeeding twice as much as their predecessors, the doctrine itself has evolved with the growth of important industrial sectors such as computers and communications, as well as drugs and medical inventions, as Section B discusses. Section C reveals the Federal Circuit judges responsible for shaping the law today and how they voted. It also debunks the myth that the doctrine of equivalents is an equitable doctrine and argues that the doctrine is better characterized as one preventing unfair competition. Section D completes the portrait of the modern doctrine of equivalents by presenting data of interest to both academics and practitioners. It shows how courts applied the doctrinal tests and their limitations. It also shows the dominant litigation venues and strategies taken by the litigating parties in those venues.

A. Revitalization

Fifteen years ago, the Allison-Lemley study declared “[t]he doctrine of equivalents is for all intents and purposes dead, and has been for years, even as lawyers and judges were seeing it as

¹⁶⁴ G.H. Freeman, & J. H. Halton, *Note on an Exact Treatment of Contingency, Goodness of Fit and Other Problems of Significance*. 38 BIOMETRIKA, 141, 141 (1951).

¹⁶⁵ E. L. LEHMANN, & J. P. ROMANO, *TESTING STATISTICAL HYPOTHESES*, 350–51 (3d ed. 2010).

too expansive and struggling to cabin it.”¹⁶⁶ They reason that patentee win rates are not “even close to 50%,” presumably based on the Priest-Klein hypothesis discussed below.¹⁶⁷ The Allison-Lemley study concludes that “in the cases litigated to judgment, patentees overwhelmingly lose doctrine of equivalents cases.”¹⁶⁸ In reaching this conclusion, the Allison-Lemley study makes two observations. First, more than two-thirds of patentee “victories” involved “defeating an accused infringer’s motion for summary judgment.”¹⁶⁹ This, they dismiss as “hardly the same as actually winning the case on equivalents grounds.”¹⁷⁰ Second, they note that less than 10% of cases involved patentees “actually winning the case on equivalents grounds.”¹⁷¹

To examine the vitality of the doctrine between 2009–2019, this Article similarly distinguishes between procedural and substantive wins. Patentee win rates on the merits are 21% (district courts) and 22% (Federal Circuit). Patentee win rates on procedural issues are 14% (district courts) and 8% (Federal Circuit). The doubling of patentee win rates on the merits at both district courts and the Federal Circuit is remarkable in and of itself. What is also interesting is that while patentee wins on the merits have risen, patentee win rates on procedural issues have fallen sharply from “two-thirds” observed in the Allison-Lemley study to between 8% to 14%.

Equally striking is the observation when these results are placed in the context of doctrine of equivalents data over a forty-year period. Professor Crouch charted case outcomes at the

¹⁶⁶ Allison & Lemley, *supra* note 4, at 967.

¹⁶⁷ *Id.* Patentees won 24% of reported cases, which the Allison-Lemley study concluded was “remarkably small” when “[c]ompared to the overall patentee win rates on other issues—54% on validity alone in cases at various stages of litigation, and 58% overall in cases that make it to trial.” *Id.* at 966. The Priest-Klein hypothesis places plaintiff win rate at 50% which is consistent with the general figure the Allison-Lemley study reports. *See infra* note 176 and accompanying text. A study by Gibson, Dunn & Crutcher LLP on 2017/2018 Federal Circuit appeals reports similar overall patentee win rate of 55%. GIBSON DUNN, FEDERAL CIRCUIT YEAR IN REVIEW 2017/2018, 5–6 (2018) [hereinafter GIBSON DUNN 2017/2018], <https://www.gibsondunn.com/wp-content/uploads/2018/11/Federal-Circuit-2017-2018-Year-in-Review.pdf> [https://perma.cc/7NRM-R66W].

¹⁶⁸ Allison & Lemley, *supra* note 4, at 967

¹⁶⁹ *Id.*

¹⁷⁰ *Id.*

¹⁷¹ *Id.*

Federal Circuit in a November 2019 blog post.¹⁷² The chart reveals an inverted U-shape (see Figure 1 below). This suggests that past may be prologue and that the decline that the Allison-Lemley study, as well its contemporaries, observed represents a snapshot of the doctrine on its wane. But that snapshot fails to recognize both its earlier vitality and the possibility for that revitalization to occur, as it most certainly has.

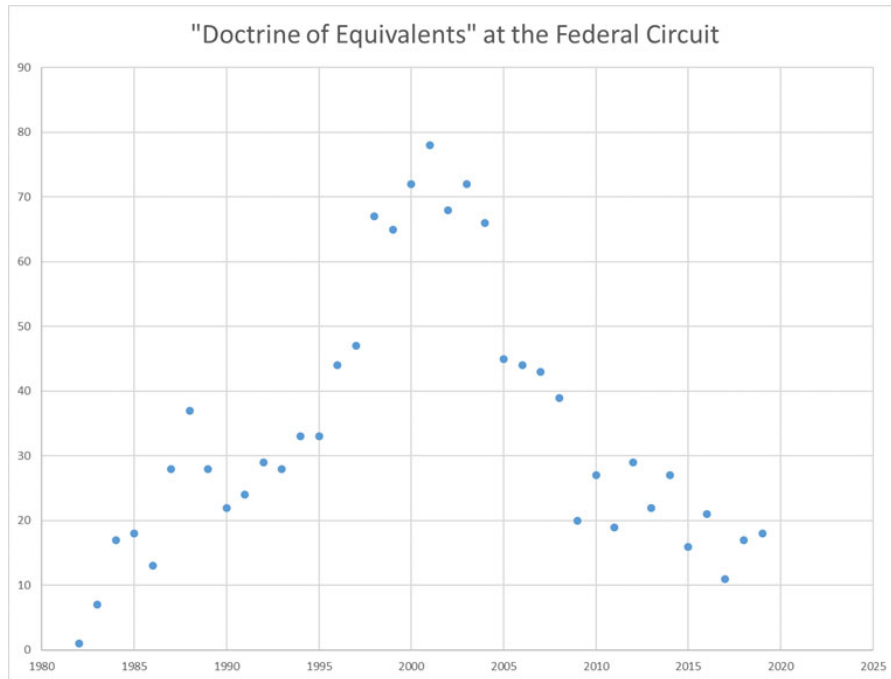


Figure 1: Patentee Wins Over Time¹⁷³

Figures 2 and 3 show that the discrepancy over time of patentees' wins over accused infringers was much more consistent at the Federal Circuit than at the district court level. This result may simply be a function of having many more of the same judges hearing those cases at the Federal Circuit.

¹⁷² Dennis Crouch, *Doctrine of Equivalents at the Federal Circuit*, PATENTLY-O, (Nov. 22, 2019), <https://patentlyo.com/patent/2019/11/doctrine-equivalents-federal.html> [<https://perma.cc/MLB9-7CBV>].

¹⁷³ *Id.*

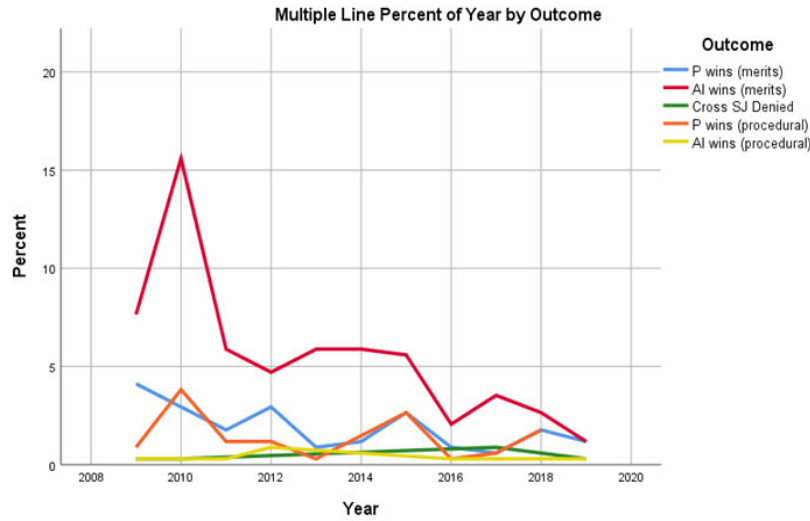


Figure 2: Overall Wins over Time (District Court)

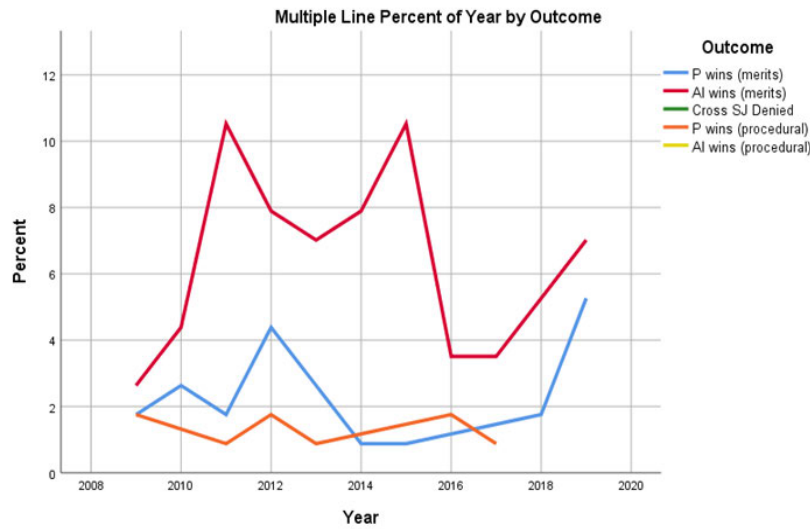


Figure 3: Overall Wins over Time (Federal Circuit)

Conventional wisdom states that patentees are less successful invoking the doctrine after *Markman* hearings became important.¹⁷⁴ Whether the doctrine is “dead” is a normative

¹⁷⁴ See Allison & Lemley, *supra* note 4, at 977–98.

question whose parameters are debatable. However, using the metrics in the Allison-Lemley study as a baseline, it is clear that the doctrine has been revived in recent years.

Cases in which the parties were rivals dominated wins (56%). When parties were rivals, courts found for patentees on the merits between 23% (district courts) and 29% (Federal Circuit) of the time, and when parties were not rivals, district courts found for patentees 15% (Federal Circuit) to 18% (district courts) of the time. The higher patentee win rate when the alleged infringer was a rival suggests that judges continue to adhere to the Supreme Court's exhortation to safeguard patentees against unfair competition.¹⁷⁵

It is worth noting Priest and Klein posited cases that obviously favor one party over the other will settle and those that make it to judgment will be close, resulting in a 50% win rate.¹⁷⁶ Most cases are not obvious.¹⁷⁷ Moreover, an "overall" win rate—which can mean either including pre-trial outcomes or district court decisions consolidated with non-redundant appellate decisions—are between 25% to 36% and therefore inconsistent with Priest-Klein.¹⁷⁸ Commenters have also disputed the validity of the hypothesis in patent cases.¹⁷⁹ Technological quirks and the nature of the parties result in fact-specific outcomes.¹⁸⁰ Multiple patent law doctrines may be interrelated and changes in one may

¹⁷⁵ See *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607–08 (1950) (“The doctrine of equivalents evolved in response to this experience.”).

¹⁷⁶ George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1, 19–20 (1984).

¹⁷⁷ Jason Rantanen, *Why Priest-Klein Cannot Apply to Individual Issues in Patent Cases*, U. IOWA LEGAL STUD. RES. PAPER NO. 12-15, Mar. 25, 2013 at 1, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2132810 (“At best, the Priest-Klein hypothesis only applies to the selection of disputes, not the selection of individual issues. Due to the presence of multiple issues in patent cases, there is axiomatically no basis for inferring that a patentee would expect a fifty-percent chance of winning on each one.”).

¹⁷⁸ See Chris Barry et al., *2017 Patent Litigation Study: Change on the Horizon?*, PWC 15 (May 2017) (reporting on district court sample including trial and pre-trial outcomes) <https://www.pwc.com/us/en/forensic-services/publications/assets/2017-patent-litigation-study.pdf> [<https://perma.cc/Y8P6-9Y43>].

¹⁷⁹ See Mark A. Lemley & Colleen V. Chien, *Are the U.S. Patent Priority Rules Really Necessary?*, 54 HASTINGS L.J. 1299, 1310–12 (2003) (arguing that the Priest-Klein hypothesis is not borne out by the data in patent cases).

¹⁸⁰ Schwartz, *supra* note 4, at 1187 (“For example, patent litigation between branded and generic drug manufacturers differs from patent litigation over a business method patent held by a non-practicing entity.”).

affect another.¹⁸¹ As Professors Holte and Sichelman noted, “changes in litigation budgets, attorney quality, and other unobservable factors” may have changed the behavior of parties, “rather than judicial decisionmaking.”¹⁸² Finally, the percentage of patentee wins must be regarded with some caution in concluding whether it is important or not. For example, in employment discrimination litigation, the plaintiff win rate is 33%.¹⁸³ However, the literature endorses the importance of employment discrimination training to avoid litigation.¹⁸⁴ One reason may be because the stakes are so asymmetric.

B. Evolution

The Allison-Lemley study reported mechanical devices made up 61.7% of the cases between 1999 and 2004, while pharmaceutical inventions made up a mere 6.5%.¹⁸⁵ Industries innovate differently, obtain patents differently, and exploit the patents in different ways.¹⁸⁶ This Article relied on the six National Bureau of Economic Research (“NBER”) technology classifications to examine whether there were industry-specific differences in doctrine of equivalents cases.¹⁸⁷ Intertemporal

¹⁸¹ *Id.* at 1188 (“Changes in precedent can alter lawyers’ behavior in drafting patents. Furthermore, changes in precedent can also influence party behavior in litigation.”).

¹⁸² Holte & Sichelman, *supra* note 19, at 161.

¹⁸³ Kevin M. Clermont & Stewart J. Schwab, *How Employment Discrimination Plaintiffs Fare in Federal Court*, 1 J. EMPIRICAL LEGAL STUD. 429, 439 n.13 (2004).

¹⁸⁴ See generally Todd J. Maurer & Nancy E. Rafuse, *Learning, Not Litigating: Managing Employee Development and Avoiding Claims of Age Discrimination*, 15 ACAD. MGT. PERSPS. 110 (2001).

¹⁸⁵ Allison & Lemley, *supra* note 4, at 972–73. The Allison-Lemley study used a slightly different classifications than this Article and reported the following results: mechanical devices (61.7%), software (22.0%), electronics (19.6%), pharmaceuticals (6.5%), and biotechnology (2.7%).

¹⁸⁶ Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1581–95 (2003).

¹⁸⁷ Bronwyn H. Hall, Adam B. Jaffe & Manuel Trajtenberg, *The NBER U.S. Patent Citations Data File: Lessons, Insights and Methodological Tools* 3 (NBER, Working Paper No. 8498, 2001), <http://www.nber.org/patents> (describing six technologies: chemistry, computers and communications, drugs and medical, electrical and electronic, mechanical, and other). The NBER classifications “are regularly used in empirical patent law scholarship, and are a useful way to distinguish outcomes and reasoning by technology type.” Holte & Sichelman, *supra* note 19, at 138. For other studies employing the NBER methodology, see, e.g., Michael Risch, *A Generation of Patent Litigation*, 52 SAN DIEGO L. REV. 67, 84–85 (2015); Christopher A. Cotropia, Jay P. Kesan & David L. Schwartz, *Unpacking Patent Assertion Entities (PAEs)*, 99 MINN. L. REV. 649, 680 (2014).

studies like these are particularly useful in revealing how industries may change over time. Here, the results are nothing short of dramatic.

From 2009 to 2019, computer and communications inventions dominated the dataset (32%), and these, together with drug and medical inventions (23%), make up over half of reported cases. In contrast, 22% of cases involve mechanical devices, or less than a third from just a decade or so ago. Figure 4 shows this trend, with mechanical inventions dropping off sharply from 2010 and never recovering. A recent report on Federal Circuit cases by Gibson Dunn supports this Article's calculations.¹⁸⁸ Most Federal Circuit cases from 2018 and 2019 involved Software/Electrical (39%), Chemical/Pharmaceutical (24%), or Biotech/Medical Device (10%) cases, with Mechanical comprising 21% of cases, and Business Method comprising 6%.¹⁸⁹

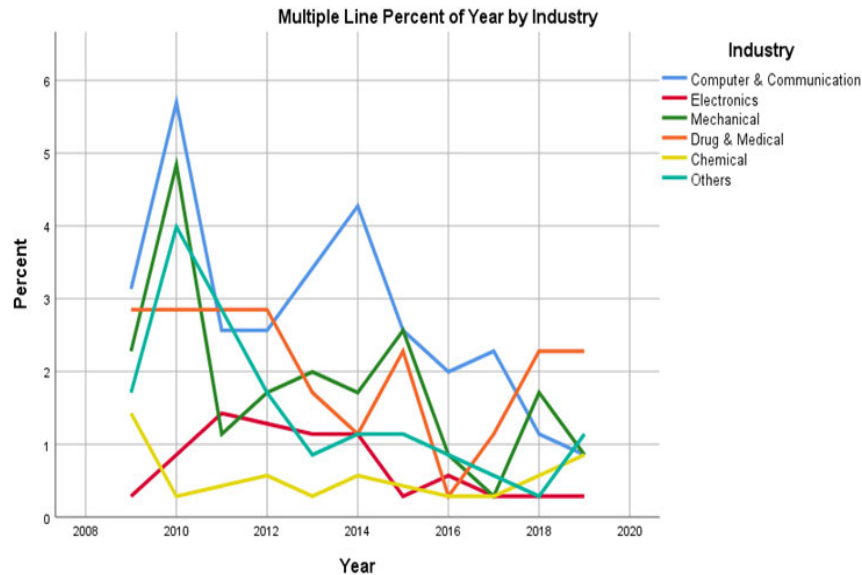


Figure 4: Industries over Time

¹⁸⁸ GIBSON DUNN, FEDERAL CIRCUIT YEAR IN REVIEW 2018/2019, 6 (2019) [hereinafter GIBSON DUNN 2018/2019], <https://www.gibsondunn.com/wp-content/uploads/2019/12/Federal-Circuit-2018-2019-Year-in-Review.pdf> [https://perma.cc/5RVF-X9XN]. See also GIBSON DUNN 2017/2018, *supra* note 167, at 3.

¹⁸⁹ See GIBSON DUNN 2018/2019, *supra* note 188, at 6. Similar percentages were reported in 2017/2018. See GIBSON DUNN 2017/2018, *supra* note 167, at 3.

The Holte-Sichelman study on nonobviousness, which also involves a similarly amorphous patent law standard, also notes a more significant rise in computers and communications patents, as well as in drugs and medical patents compared to mechanical patents.¹⁹⁰ The authors note that “it could very well be that the shift in the district courts and Federal Circuit toward findings of obviousness was merely driven by the changing nature of the technologies under consideration.”¹⁹¹

Commentators predicted that the doctrine of equivalents would play a more important role in the information technology industries due to the rapid pace of product change and uncertain scope of product claims in those industries.¹⁹² The contours of mechanical patents may have been settled by a much longer historical runway of litigation, whereas the computer and communications industries, as well as drug and medical inventions, comprise the pillars of modern economy in the form of smartphones, the Internet of Things, personalized medicine, and biologics. The 2011–2015 period where computer and communications inventions peaked in frequency mirrors the period of patent litigation in smartphone technology.¹⁹³ While a closer look is needed to ascertain a causal relationship, it is possible that patentees employed the doctrine in their pursuit of infringers during that period.

Commentators have also questioned more generally whether the doctrine of equivalents can apply meaningfully to “rapidly evolving technologies,”¹⁹⁴ including biologics,¹⁹⁵ biomedical,¹⁹⁶ and

¹⁹⁰ Holte & Sichelman, *supra* note 19, at 149.

¹⁹¹ *Id.*

¹⁹² See Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CALIF. L. REV. 1, 45–47 (2001).

¹⁹³ Charles Duhigg & Steve Lohr, *The Patent, Used as a Sword*, N.Y. TIMES (Oct. 7, 2012), <https://www.nytimes.com/2012/10/08/technology/patent-wars-among-tech-giants-can-stifle-competition.html>; Jack Nicas, *Apple and Samsung End Smartphone Patent Wars*, N.Y. TIMES (June 27, 2018), <https://www.nytimes.com/2018/06/27/technology/apple-samsung-smartphone-patent.html>.

¹⁹⁴ William S. Galliani, *Patent Infringement Amidst Rapidly Evolving Technologies: New Equivalents, the Doctrine of Equivalents and the Reverse Doctrine of Equivalents*, 6 SANTA CLARA COMPUTER & HIGH TECH. L.J. 75, 78, 87–89 (1990). Cf. Burk & Lemley, *supra* note 186, at 1658 (describing how the reverse doctrine of equivalents “can apply to radical improvements in any area of technology, and it has indeed been used to cover technological paradigm shifts within an industry.”).

¹⁹⁵ D. Alan White, *The Doctrine of Equivalents: Fairness and Uncertainty in an Era of Biologic Pharmaceuticals*, 60 EMORY L.J. 751, 769 (2011) (“[I]n cases

nanotechnology.¹⁹⁷ The results in this Article indicate that courts are quite willing to employ the doctrine of equivalents to these industries.

The results show that courts used the “function-way-result” test in 20% of mechanical cases, trailing behind both computer and communications (32%) and drug and medical devices (25%) cases. One reason may be that mechanical patents are relatively simpler and can be adjudicated and disposed of using literal infringement analysis. As a result, fewer patentees may choose to assert mechanical patents under the doctrine of equivalents. That is an empirical question that could be the subject of a future study.

At the district court, patentees did best in electronics cases (35%), while at the Federal Circuit, they did best in drug and medical cases (36%). In contrast, the Allison-Lemley study found no industry-specific differences in outcomes, with the range falling between 22.2% and 29.0%, “a remarkably narrow range that closely brackets the overall patentee win rates.”¹⁹⁸ The numbers suggest that patentees’ attorneys may be doing a good job advising their clients to focus on industries where courts seem to be more willing to find for patentees, and to avoid litigating in those areas where courts take a less charitable view of infringement assertions. In doing so, they have kept their margin of wins while reducing exposure in industries where doctrine of equivalents assertions will unlikely stick.

C. *Hostility & Endorsement at the Federal Circuit*

In 1982, to introduce uniformity and certainty into patent law, Congress established the U.S. Court of Appeals for the Federal Circuit as the forum for patent appeals.¹⁹⁹ Chief Judge Prost (10%), together with Judge Lourie (9%), and Judge Reyna (8%) decided over one in four cases on appeal (27%). Based on frequency alone, these three judges may have been most

involving the doctrine of equivalents, ultimate questions of fact are often decided by juries that are poorly equipped to deal with complex scientific issues.”)

¹⁹⁶ Faith S. Fillman, *Doctrine of Equivalents: Is Festo the Right Decision for the Biomedical Industry?*, 33 ST. MARY'S L.J. 493, 513–14 (2002).

¹⁹⁷ Andrew Wasson, *Protecting the Next Small Thing: Nanotechnology and the Reverse Doctrine of Equivalents*, DUKE L. & TECH. REV. ¶ 6 (2004).

¹⁹⁸ Allison & Lemley, *supra* note 4, at 973.

¹⁹⁹ Lim, *I Dissent*, *supra* note 140, at 950.

influential among Federal Circuit judges in shaping our contemporary understanding of the doctrine of equivalents.

On the merits, the judges who decided most often in favor of patentees were: Judge Linn (75%), Judge Taranto (50%), Judge Moore (36%), and Judge Rader (32%). Judge Stoll (100%), Judge Hughes (100%), Judge O'Malley (87%), Judge Bryson (81%), and Judge Lourie (80%) decided most often in favor of alleged infringers. The Allison-Lemley study indicates that by the late 1990s, patentees almost never prevailed at trial or on appeal.²⁰⁰ The foregoing discussion, as well as Figure 5, shows that if a patentee failing was ever an accurate conclusion, it is no longer true. Figure 5 shows that almost every judge found for patentees between 2009 and 2019.

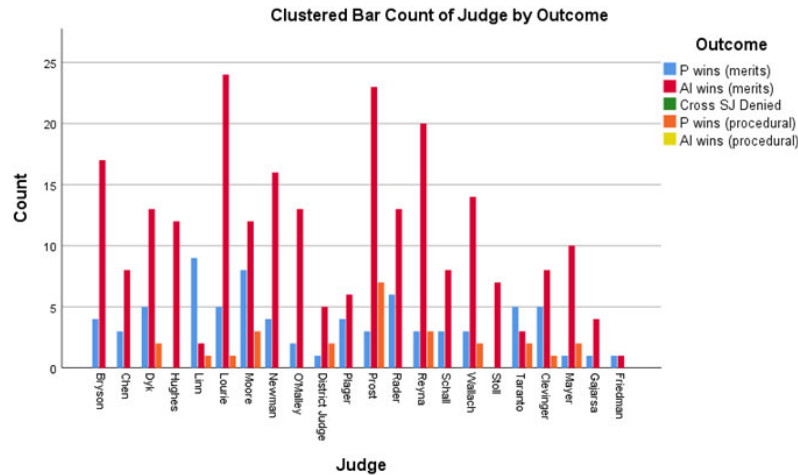


Figure 5: Federal Circuit Judges by Outcome

Judge Lourie's hostility toward the doctrine was also evident anecdotally through his opinions. In the 2019 case of *Amgen Inc. v. Sandoz Inc.*, Judge Lourie wrote that “[t]he doctrine of equivalents *applies only in exceptional cases and* is not ‘simply the second prong of every infringement charge, regularly available to extend protection beyond the scope of the claims.’”²⁰¹

²⁰⁰ Allison & Lemley, *supra* note 4, at 970–71.

²⁰¹ *Amgen Inc. v. Sandoz Inc.*, 923 F.3d 1023, 1029 (Fed. Cir.), *reh'g granted*, 776 F. App'x 707 (Fed. Cir. 2019) (emphasis added) (quoting *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538 (Fed. Cir. 1991)) (citing *Duncan Parking Techs.*,

Professor Crouch criticized this attempt to cabin the doctrine, writing that “the court’s limit of the [doctrine of equivalents] to ‘exceptional cases’ seems to be a major step without precedential backing.”²⁰² *Amgen* cited Professor Crouch’s post in its petition for rehearing en banc.²⁰³ The Court responded by altering its opinion to remove what, according to Professor Crouch was, “the most offensive portion of its decision,” who explained that:

The decision as it reads now recognizes that [doctrine of equivalents] winners will be rare—and that rarity stems from the nature of the [doctrine of equivalents] test. In particular, [the doctrine of equivalents] only applies when the accused device or method is different from what is claimed but may not be “substantially different” on an element-by-element basis.²⁰⁴

This Article examines 96 Federal Circuit cases, just under a third of the 351 cases reported in the dataset. Overall, the Federal Circuit found for patentees in 22% of the cases, higher than the overall figure during the 1999–2004 period in the Allison-Lemley study (16.8%).²⁰⁵ The Federal Circuit affirmed a supermajority of district court decisions (82%), reflecting a confidence in the lower courts’ judgment not found in other instances (Figure 6, below). For instance, the overall affirmance rate at the Federal Circuit between August 1, 2017 and July 31, 2018 stood at 70% for infringement cases.²⁰⁶

Inc. v. IPS Grp., Inc., 914 F.3d 1347, 1362 (Fed. Cir. 2019) (“[T]he doctrine of equivalents cannot be used to effectively read out a claim limitation . . . because the public has a right to rely on the language of patent claims.”).

²⁰² Dennis Crouch, *Federal Circuit: “The Doctrine of Equivalents Applies ONLY in Exceptional Cases,”* PATENTLY-O (May 8, 2019), <https://patentlyo.com/patent/2019/05/doctrine-equivalents-exceptional.html> [<https://perma.cc/C4DE-V9WE>]; see also Crouch, “*Exceptional Case*”, *supra* note 8 (“The decision was so problematic though because ‘exceptional case’ is a term of art used elsewhere in patent law and suggests creation of an additional test prior to allowing a patentee to rely upon [doctrine of equivalents].”).

²⁰³ *Amgen’s Petition for Rehearing En Banc* at 9, *Amgen Inc. v. Sandoz Inc.*, 923 F.3d 1023 (Fed. Cir.) (No. 18-1551), *reh’g granted*, 776 F. App’x 707 (Fed. Cir. 2019).

²⁰⁴ See Crouch, “*Exceptional Case*”, *supra* note 8.

²⁰⁵ Allison & Lemley, *supra* note 4, at 970.

²⁰⁶ GIBSON DUNN 2017/2018, *supra* note 167, at 8. *But see* GIBSON DUNN 2018/2019, *supra* note 188, at 13 (reporting a Federal Circuit affirmance rate of 55% percent between August 1, 2018 and July 31, 2019).

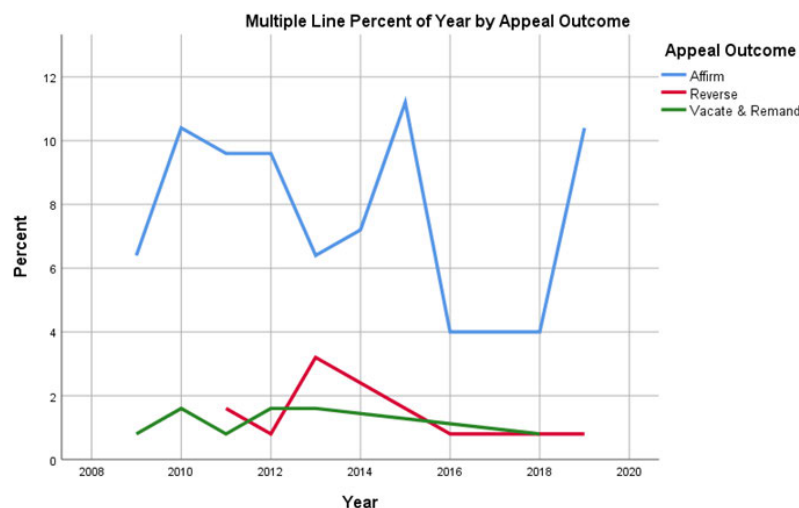


Figure 6: Appeal Outcome

While it is reasonably clear that the doctrine seeks to ensure patentees get fair protection in their claims, there is less consensus on what extent “equitable” principles animate the doctrine.²⁰⁷ The Supreme Court has justified the doctrine as an equitable safeguard against “piracy,” “stealing,” and “fraud.”²⁰⁸ Over the years, some, including judges at the Federal Circuit, believe the doctrine of equivalents is “designed to do equity,”²⁰⁹ or that “its roots firmly in equity, and to acknowledge that when and in what circumstances it applies is a question of equitable

²⁰⁷ Moorhead, *supra* note 79, at 1428 (noting that “the doctrine of equivalents is an equitable doctrine”). *But see* Reavill, *supra* note 15, at 320 (“Recent debate, however, has questioned the way in which the doctrine approaches the principles of equity.”). *See also* Hilton Davis Chem. Co. v. Warner-Jenkinson Co., 62 F.3d 1512, 1540 (Fed. Cir. 1995) (Plager, J., dissenting) (“[W]hen there is a wrong for which there is no adequate remedy at law, equity courts have traditionally gone beyond the law to impose a just and equitable result. Thus in those special cases in which the competitor’s product is literally different but the difference is so insubstantial as to constitute a ‘fraud on the patent,’ a court in the exercise of its extraordinary equity power may extend the remedy of infringement in order to protect the rights of the patentee granted by law.”), *rev’d*, 520 U.S. 17 (1997); *id.* at 1549 (Lourie, J., dissenting) (arguing that the doctrine’s weighing various factors is an equitable determination for a judge).

²⁰⁸ Graver Tank & Mfg. Co., Inc. v. Linde Air Prods. Co., 339 U.S. 605, 607–08 (1950).

²⁰⁹ Perkin-Elmer Corp. v. Westinghouse Elec. Corp., 822 F.2d 1528, 1532 (Fed. Cir. 1987).

law, a question for which judges bear responsibility.”²¹⁰ Commentators have blamed the doctrine’s unruly scope on its equitable roots.²¹¹ Therefore, one might think that the doctrine of equivalents is an equitable doctrine like the contract law doctrine of promissory estoppel, spun from the same cloth.²¹² If so, we would be mistaken.

The cases emphasize fair play rather equity in the legal sense. With cases involving equity, judges have been empowered to intervene when the strict legal result causes injustice—as is the case in the true “equitable” sense.²¹³ Patentees may “in all cases invoke to some extent the doctrine of equivalents,”²¹⁴ without a “judicial exploration of the equities of a case,”²¹⁵ beforehand, so they may invoke the doctrine whether or not they succeed in showing merit in an equitable sense.

In contrast, courts have no discretion to remedy a seemingly unjust result by invoking it themselves,²¹⁶ and cannot embark on a “judicial exploration of the equities of a case before allowing application of the doctrine of equivalents.”²¹⁷ Indeed, judges

²¹⁰ *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co. (Festo I)*, 234 F.3d 558, 593 (Fed. Cir. 2000) (Plager, J., concurring), *vacated*, 535 U.S. 722 (2002), and *aff'd*, 493 F.3d 1368 (Fed. Cir. 2007).

²¹¹ See, e.g., Gregory J. Smith, *The Federal Circuit’s Modern Doctrine of Equivalents in Patent Infringement*, 29 SANTA CLARA L. REV. 901, 912 n.64 (1989) (“[C]ourts have justified the lack of usable guidelines for applying the doctrine by stating that it is an equitable doctrine, and to constrain it with rigid rules of application would compromise the court’s equitable powers.”); Reavill, *supra* note 15, at 358 (“Without intent, the doctrine of equivalents is no more than a second stab at proving infringement for the patentee, and the doctrine loses both its equitable nature and its justification.”).

²¹² See, e.g., Jay M. Feinman, *Promissory Estoppel and Judicial Method*, 97 HARV. L. REV. 678, 680 n.18 (1984).

²¹³ *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1521 (Fed. Cir. 1995) (“[I]n doctrine of equivalents cases, this court’s allusions to equity invoke equity in its broadest sense—equity as general fairness.”), *rev’d*, 520 U.S. 17 (1997); see Timothy R. Holbrook, *Equivalency and Patent Law’s Possession Paradox*, 23 HARV. J. L. & TECH. 1, 5 (2009) (“The express purpose of [the doctrine of equivalents] is to ensure fair and adequate protection to the patentee and to solidify the patent incentive.”).

²¹⁴ *Seymour v. Osborne*, 78 U.S. 516, 556 (1870).

²¹⁵ *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 34 (1997).

²¹⁶ *Hilton Davis*, 62 F.3d at 1521 (“By referring to the doctrine as a doctrine of fairness, neither the Supreme Court nor this court has invoked the myriad implications of an alternative to legal remedies. In addition, neither the Supreme Court nor this court has invoked equity in the technical sense of a set of principles originating in England to compensate for the historically harsh rules of common law.”).

²¹⁷ *Warner-Jenkinson Co.*, 520 U.S. at 34.

never employed the doctrine independently of juries.²¹⁸ Most cases neither mention equity, nor did equity have discernable impact.²¹⁹

What might be better termed “fairness” rather than “equity” in the legal sense usually manifested when parties were rivals and when the case involved allegations of copying.²²⁰ This is consistent with the Supreme Court’s intention that the doctrine protects patentees from “piracy,” “fraud,” and “stealing.”²²¹ Evidence of copying suggested that the differences were “insubstantial.”²²²

At the same time, the doctrine tolerates copying as an intermediate step to designing around the patent.²²³ Leapfrogging advances the state-of-the-art and fuels the dynamic competition that characterizes a working patent system. Accordingly, courts treat these as exculpatory factors when looking into the substantiality of differences under the doctrine of equivalents.²²⁴ A defendant seeking this justification must show its device does more than just narrowly escape the claim.²²⁵

²¹⁸ *Id.* *Winans* itself was an appeal from a jury finding on the infringement issue and cannot be an equitable doctrine. *Winans v. Denmead*, 56 U.S. 330, 330 (1853) (“The jury, under the instruction of the District Judge, the late Judge Glenn, then sitting alone, found a verdict for the defendants; and the plaintiff brought the case to this court by a writ of error.”).

²¹⁹ *See* *Lim*, *Judging Equivalents*, *supra* note 140, at 260 (reporting that the equitable nature of the case as such did not dominate the outcome of cases in the dataset. Most cases—about 73%—“did not mention equity in any form Of the cases that did, those that found for patentees and defendants were about evenly split . . .”).

²²⁰ *Id.* at 263, 265 (reporting that copying has not been prominent, comprising 8% of all cases. Patentees won 64% of cases involving copying). Rivalry plays an important role in copying cases, with patentees twice as likely to win against a rival than against a non-rival. *Id.* Patentees succeeded 60% in cases where they alleged copying, compared with defendants alleging design-around/independent inventions (40%). *Id.*

²²¹ *Graver Tank & Mfg. Co., Inc. v. Linde Air Prods. Co.*, 339 U.S. 605, 612 (1950) (Black, J., dissenting).

²²² *Hilton Davis Chemical Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1519 (Fed. Cir. 1995), *rev’d* 520 U.S. 17 (1997).

²²³ *Id.* at 1520.

²²⁴ *Id.* at 1532–33 (Newman, J., concurring) (“If minor improvements are likely to be captured by the doctrine of equivalents, this might cause the would-be competitor to move to diverging areas instead of simply tagging along at the periphery of the patentee’s claims. On this theory the doctrine . . . could encourage ‘leapfrogging’ advances as opposed to minor improvements and substantial imitation.”).

²²⁵ *See* Paul N. Katz, *The Doctrine of Equivalents and Its Impact on “Designing Around”*, 4 FED. CIR. B.J. 315, 316, 320–21 (1994).

Moreover, defendants who were not rivals of the patentees-in-suit were more likely to prevail than if the parties were rivals in cases involving claims of design-arounds and independent invention.²²⁶

The arc of history suggests that the doctrine of equivalents continues to lack a coherent vision. In 1994, patent attorney Rudolph Hofmann lamented how “[t]he patent community continues to struggle to develop an analysis that is both equitable and predictable.”²²⁷ In 2000, then-Federal Circuit Chief Judge Michel called the doctrine “the most difficult and least predictable of all doctrines in patent law to apply”²²⁸ and admitted that the court’s decisions did not increase the predictability of outcomes of disputes “litigated to conclusion through appeal.”²²⁹ Two years later, Federal Circuit Judge Rader confessed that “[f]ew problems have vexed this court more than articulating discernible standards for non-textual infringement.”²³⁰ In 2007, Professors Allison and Lemley observed that case law on the doctrine was in disarray, with courts “analyz[ing] the facts on a completely ad hoc basis.”²³¹

These comments are legitimate insofar as they reflect a sincere view that all is not as it should be with the doctrine of equivalents. At the same time, however, the pessimism should also be seen in perspective. Patent law features a host of complex issues, including lost profits, written description, and the doctrine of equivalents. Professor Sichelman found that direct infringement and doctrine of equivalents cases both had a reversal rate of 15% based on a study of Federal Circuit cases

²²⁶ Lim, *Judging Equivalents*, *supra* note 140, at 265–66 (“[T]he accused infringer, who was not a rival, was significantly more likely to prevail against a patentee than if the parties were rivals (75.0% versus 54.5%). This is consistent with the view that the doctrine’s purpose is to protect the patentee from copyists, and not innovators.”).

²²⁷ Rudolph P. Hofmann, Jr., *The Doctrine of Equivalents: Twelve Years of Federal Circuit Precedent Still Leaves Practitioners Wondering*, 20 WM. MITCHELL L. REV. 1033, 1034 (1994); Moorhead, *supra* note 79, at 1428–29 (“This difficulty is enhanced by the fact that even the members of the United States Court of Appeals for the Federal Circuit cannot agree on its application.”).

²²⁸ Paul R. Michel, *The Role and Responsibility of Patent Attorneys in Improving the Doctrine of Equivalents*, 40 IDEA: J.L. & TECH. 123, 123 (2000).

²²⁹ *Id.* at 124 (“Today, as far as equivalent infringement goes, patent lawyers cannot with certainty predict dispute outcomes under the doctrine of equivalents.”).

²³⁰ *Johnson & Johnston Assocs., Inc. v. R.E. Serv. Co., Inc.*, 285 F.3d 1046, 1056 (2002) (Rader, J., concurring).

²³¹ Allison & Lemley, *supra* note 4, at 228 (alteration in original) (quoting Glitzenstein, *supra* note 13, at 309).

between 2000–2007.²³² In contrast, as shown in Figure 7, “the reversal rate on section 102(a) prior art issues was 41 percent for appealing patentees and 31 percent for appealing accused infringers.”²³³ In so far as reversal rates are an indicator of malignancy, the doctrine seems relatively benign.

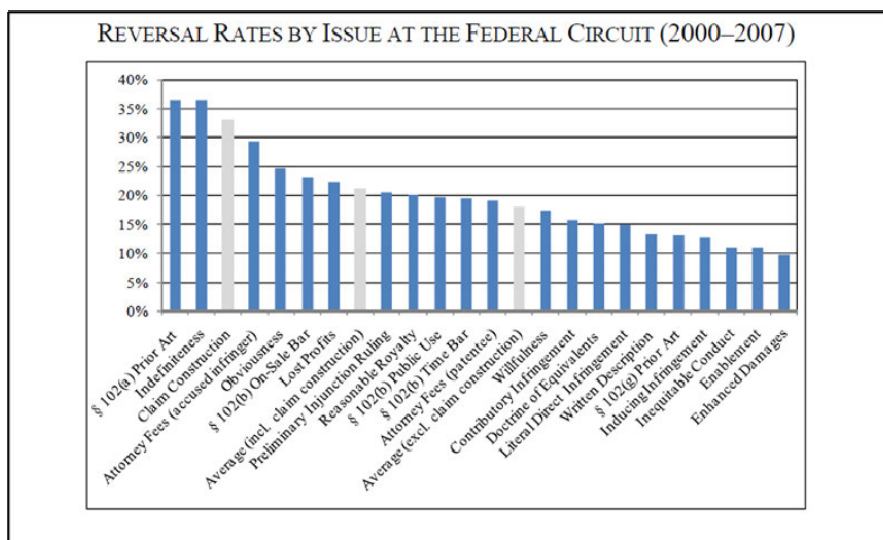


Figure 7: Reversal Rates by Issue at the Federal Circuit (2000 - 2007)²³⁴

D. Theory and Practice

1. Doctrinal Tests

Is the “function-way-result” test the test courts most commonly apply in practice as concluded in the Allison-Lemley study?²³⁵ Courts employed the “function-way-result” test about a third of the time (36%) between 2009–2019, an almost identical result compared with the Allison-Lemley study (36.5%) between 1999–2004.²³⁶ Patentees prevailed between 22% (district court)

²³² Sichelman, *supra* note 160, at 1179.

²³³ *Id.* at 1178.

²³⁴ *Id.* at 1175.

²³⁵ See Allison & Lemley, *supra* note 4, at 959 (“The most commonly applied test, which fits mechanical inventions particularly well but which is also applied to other kinds of subject matter, is the ‘function-way-result’ test.”).

²³⁶ *Id.* at 980.

to 17% (Federal Circuit) of the time between 2009–2019, much lower in their win rate under the Allison-Lemley study (33.5%) between 1999–2004.²³⁷ Under the “insubstantial differences” test, patentees prevailed between 15% (district court) to 25% (Federal Circuit) of the time, dramatically lower than counterparts studied by Allison-Lemley, where patentees won under the “insubstantial differences” test in 29.5% of cases.²³⁸

As illustrated in Part III, this Article observed more cases related to chemical inventions, which conventional wisdom links to the “insubstantial differences” test, than cases related to mechanical inventions, which conventional wisdom links to the “function-way-result” test.²³⁹ We should expect more cases employing the “insubstantial differences” test, not less. This indicates courts are finding the “function-way-result” test to be adequate.

Courts applied both tests 21% of the time between 2009–2019, also lower than under the Allison-Lemley study, which found courts applying more than one test 30.5% of the time.²⁴⁰ When courts applied both tests between 2009–2019, patentees prevailed between 24% (district court) to 36% (Federal Circuit) of the time. Figure 8 below shows that use of the “function-way-result” test declined precipitously between 2009 and 2011, never recovering. This is due in part to the declining number of cases from 2011 onward. The Allison-Lemley study had no comparable data.

²³⁷ *Id.* at 975.

²³⁸ *Id.* at 967.

²³⁹ Courts and commentators have criticized the “function-way-result” as being inadequate for chemical compounds because it focuses on function even though the invention is defined by its structure, and different structures can perform the same function in the same way to achieve the same result. *See Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 39–40 (1997) (“[W]hile the [‘function-way-result’] test may be suitable for analyzing mechanical devices, it often provides a poor framework for analyzing other products or processes.”); *see also Mylan Instl. LLC v. Aurobindo Pharma Ltd.*, 857 F.3d 858, 869 (Fed. Cir. 2017). (“[T]he substantial differences test may be more suitable than [the function-way-result test] for determining equivalence in the chemical arts.”).

²⁴⁰ Allison & Lemley, *supra* note 4, at 974–75.

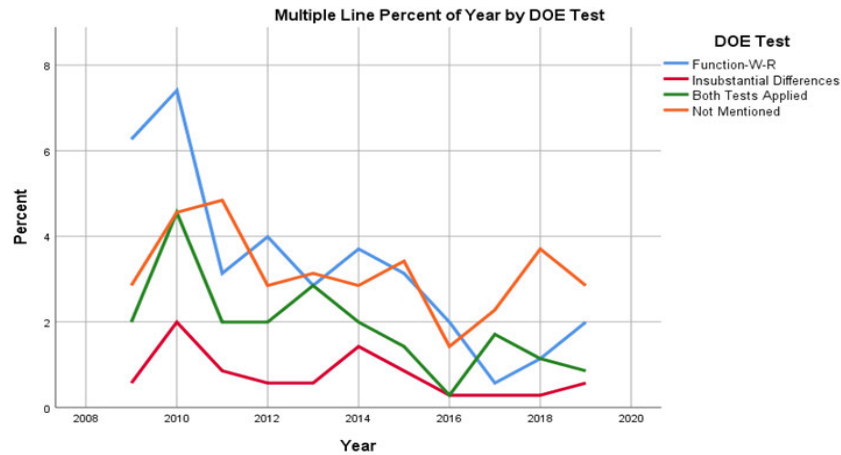


Figure 8: Doctrine of Equivalents (“DOE”) Test over Time

2. Judicial Limits

As a question of law, limitations to the doctrine of equivalents enable judges to enter summary judgments of non-infringement in favor of defendants, protecting them from “baseless patent infringement claims.”²⁴¹ Most cases (45%) did not discuss one of the four bars to the doctrine of equivalents. How did courts apply prosecution history estoppel, deemed by commentators as “the one that has created the most controversy”?²⁴²

Prosecution history estoppel was most frequently raised by accused infringers (27%), followed in turn by the “all-elements” rule (18%), and then distantly by the public dedication rule (5%) and the prior art bar (4%). At the district court level, the dominance of prosecution history estoppel and the “all-elements” rule tracks the success accused infringers enjoy in defeating patentee’s infringement claims.

Accused infringers prevailed in a whopping 71% of cases under the “all-elements” rule, followed closely by prosecution history estoppel (69%), with the public dedication bar (56%) and the prior art rule (50%) trailing behind. This striking map of the limits accused infringers raised against their relative success

²⁴¹ Meurer & Nard, *supra* note 4, at 1999.

²⁴² Allison & Lemley, *supra* note 4, at 960.

rates suggests that patent attorneys are attuned to the most effective arguments in advising their clients, and courts validate the judgment of those attorneys in turn. Results at the Federal Circuit level track those at the district court.²⁴³

One reason for the relatively poor showing by accused infringers using the public dedication and prior art rules is that patent applicants must navigate prior art arguments as a matter of course and patentees are consequently more skilled at prevailing against alleged infringers who argue that a limit to the doctrine should apply. The Allison-Lemley study offers an interesting insight on the relatively good win rates for patentees. It surmised that “[t]his is probably because the all elements rule is intended as a limiting doctrine, and a court is likely to invoke it (or the related ‘vitiating an element’ approach) only where the patentee is arguing for an interpretation that would effectively eliminate an element of the patent claim.”²⁴⁴

The Allison-Lemley study focused on patentee rather than infringer wins.²⁴⁵ A table with a side-by-side comparison reveals results to be consistent across 1999–2019 at the Federal Circuit level with respect to prosecution history estoppel and the “all-elements” rule. No conclusion can be drawn with respect to the prior art bar since the Allison-Lemley study omitted it. Similarly, with only one win reported at the Federal Circuit level out of eight cases involving the public dedication rule, the more prudent course is to discount that result rather than draw firm conclusions on the 13% figure reported below.

²⁴³ At the Federal Circuit, accused infringers’ win rates are as follows: “all elements” rule (67%), prosecution history estoppel (67%), public dedication rule (50%), and prior art bar (33%).

²⁴⁴ Allison & Lemley, *supra* note 4, at 975.

²⁴⁵ *Id.* at 968–69.

	1999 – 2004 (Patentee Wins, Federal Circuit)	2009 – 2019 (Patentee Wins, Federal Circuit)
Prosecution History Estoppel	26.9%	25%
“All-Elements” Rule	23.5%	25%
Prior Art Bar	Not reported	33%
Public Dedication Rule	0.0%	13%

This Article also reports on the three exceptions to prosecution history estoppel: unforeseeability, tangentiality, and “some other reason.” Patentees bear the burden of showing that one or more of these exceptions apply to defeat prosecution history estoppel and prevail.²⁴⁶ At the district court level, their success rates were as follows: unforeseeability (20%), tangentiality (18%), and “some other reason” (0%). At the Federal Circuit level, the results were better: unforeseeability (50%), tangentiality (60%), and “some other reason” (0%).

Given that patentees routinely amend claims to avoid prior art during prosecution, it is unsurprising that tangentiality—a rebuttal mapped to precisely that activity—should feature prominently. However, the prominence of foreseeability is surprising. Equivalents are “foreseeable” even if one of ordinary skill in the art would not recognize that it was an equivalent or view it as acceptable for use in the invention at the time the application is filed so long as the variant *existed* at the time of the application.²⁴⁷ This requires patentees to “reach beyond conventional knowledge when filing an application or

²⁴⁶ *Festo II*, 535 U.S. 722, 740–41 (2002), *cert. denied*, 541 U.S. 988 (2004), and *aff'd*, 493 F.3d 1368 (Fed. Cir. 2007).

²⁴⁷ *Holbrook*, *supra* note 213, at 23 (“The Federal Circuit has since made foreseeability an even more stringent standard, rendering rebuttal of the *Festo* presumption effectively impossible unless the asserted equivalent is solely the result of later-developed technology.”).

amendment to anticipate all potential uses of extant technologies that may be relevant to the claimed invention.”²⁴⁸ The problem, as Federal Circuit Judge Newman argued, is that patentees may not fully appreciate existing technology until a later date.²⁴⁹ Foreseeability is an uphill battle, so to see patentees succeeding comparably well with tangentiality suggests that further study should be done to investigate how patentees made those arguments and why they succeeded. No other empirical study in the literature has reported on these results, so there is no basis for intemporal comparison.

3. Venue and Posture

The choice of venue is central to the strategy of litigating parties. Patentees select their venues as best as they can in hopes that their choice would buttress the chances of a favorable outcome, or hedge against an unfavorable one.²⁵⁰ Earlier studies concluded that a statistically significant difference existed between districts for other important issues in patent litigation.²⁵¹ This Article sought to determine which venues formed the principal battlegrounds for parties in doctrine of equivalents cases and whether that influenced the outcomes.

Which regional circuit courts and appellate judges have been most influential in shaping our understanding of the doctrine of equivalents and which side do they tend to favor?²⁵² The dataset revealed that cases from the Third Circuit (28%), Seventh Circuit (13%), and Ninth Circuit (18%) dominated. No other circuits came close. As is apparent from Figure 9 below, the Third Circuit's dominance was largely unchallenged throughout the entire eleven-year sweep of the dataset. This was likely due to its popularity as the seat of incorporation for many companies.

²⁴⁸ *Id.* at 24.

²⁴⁹ *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co. (Festo IV)*, 493 F.3d 1368, 1384 (Fed. Cir. 2007) (Newman, J., dissenting).

²⁵⁰ Christopher B. Seaman, *Willful Patent Infringement and Enhanced Damages After In Re Seagate: An Empirical Study*, 97 IOWA L. REV. 417, 449 (2012) (“Patentees frequently engage in forum shopping by filing suit in districts that are perceived as favorable.”). *But see* *TC Heartland LLC v. Kraft Foods Grp. Brands LLC*, 137 S. Ct. 1514, 1516 (2017) (holding that venue depends on the defendant’s “regular and established place of business,” which is its state of incorporation).

²⁵¹ Moore, *supra* note 153, at 919 tbl.10 (finding significant variation between districts on findings of infringement and validity).

²⁵² *See supra* Section III.C.

Specifically, “65% of Fortune 500 companies and over half of all U.S. publicly traded companies are incorporated in Delaware.”²⁵³

While the Ninth Circuit originally shared the Third Circuit’s dominance, its dominance fell precipitously from 2012 onward, never quite recovering. To understand a reason for this development, it is useful to look at Figure 10, which shows the distribution of cases by industry over time. Most of the computer and communications cases originated from district court cases in the Ninth Circuit (19%) and Third Circuit (33%). Computer and communications cases also account for the largest chunk of district courts in the Ninth Circuit (33%). As the number of these cases declined at the Ninth Circuit, the number of cases originating from the Ninth Circuit overall also declined.

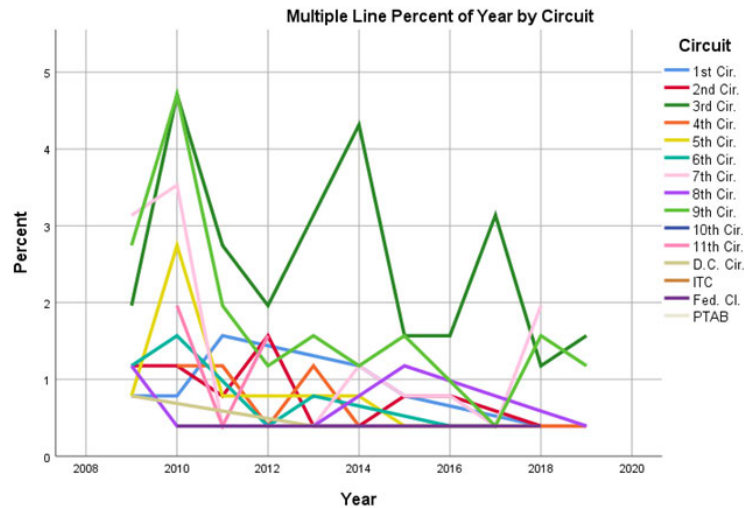


Figure 9: Distribution of Cases by Circuit over Time (District Court)

²⁵³ Harvard Bus. Servs., *Why Delaware Corporate Law Matters So Much*, DELAWAREINC.COM (July 24, 2017), <https://www.delawareinc.com/blog/why-delaware-corporate-law-matters-so-much/> [<https://perma.cc/65AF-DGCD>] (identifying the following reasons for the popularity of such cases: “[v]enture capitalists and angel investors . . . typically prefer investing in Delaware companies than companies incorporated in other states”; “[s]tartup costs [in Delaware] . . . are among the lowest in the world”; “Delaware’s Court of Chancery . . . possesses the most current corporate case law in the country”; and “[Delawarean] corporations retain tremendous flexibility when it comes to structuring and running their companies.”).

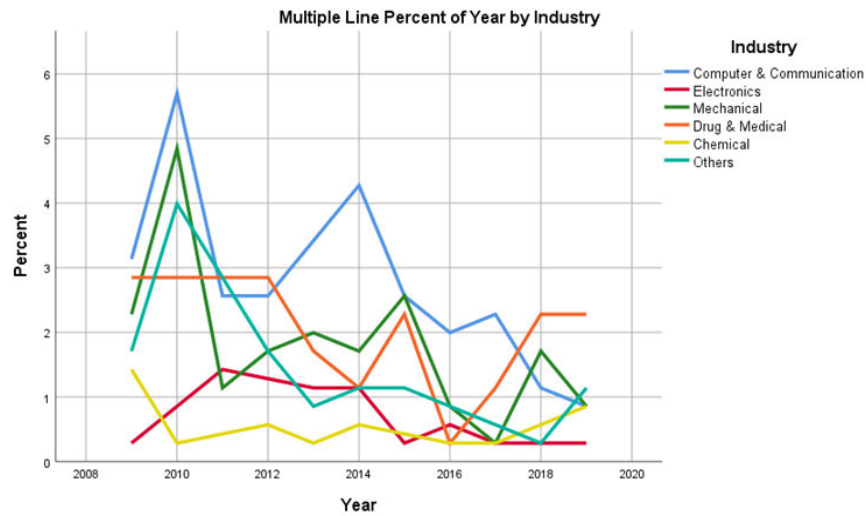


Figure 10: Distribution of Cases by Industry over Time (District Court)

At the district court level, patentees prevailed most often in the Third Circuit (35%), the Ninth Circuit (22%), and the Seventh Circuit (28%).²⁵⁴ No other empirical study on the doctrine of equivalents looked at data across the various circuits, so there is no data for comparison.

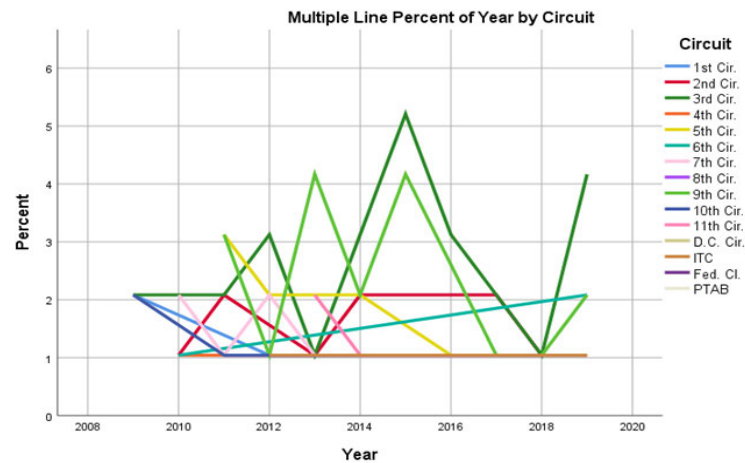


Figure 11: Distribution of Appeals to Federal Circuit

²⁵⁴ This result discounted the single patentee win in the Tenth Circuit out of the three cases heard there.

At the Federal Circuit, most cases unsurprisingly originated from district courts in the Third Circuit (22%) and Ninth Circuit (19%), and surprisingly few cases originated from the Seventh Circuit (12%) (Figure 11). This suggests that despite the relatively large number of cases heard and decided in the district courts in the Seventh Circuit, litigants there may find settlement or resolution preferable to continuing to battle on the merits.

Procedural posture was another feature of patent litigation this Article analyzed. Whether an accused device “infringe[s] under the doctrine of equivalents is a question of fact.”²⁵⁵ Courts typically grant summary judgment of noninfringement “[w]here the evidence is such that no reasonable jury could determine two elements to be equivalent.”²⁵⁶ Parties submit conflicting expert reports which usually lead judges to conclude that the issue is “an intensely factual inquiry” and must be tried to a jury.²⁵⁷ This Article coded for the eleven categories of posture (see Figure 12 below).²⁵⁸

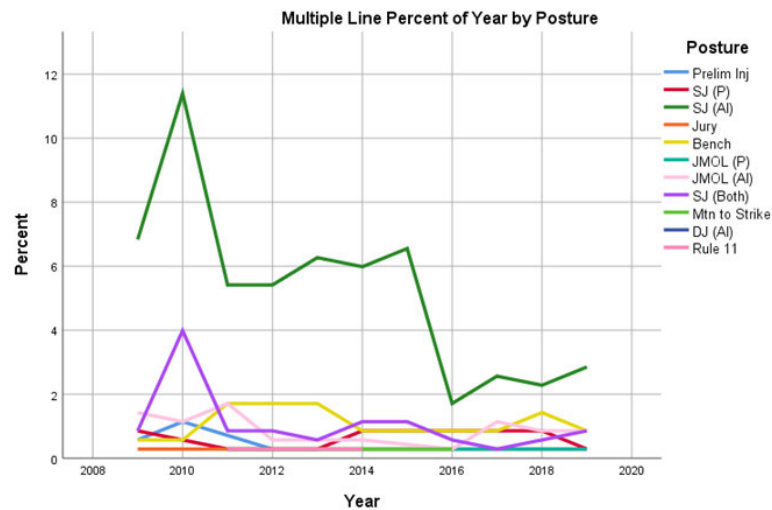


Figure 12: Procedural Posture over Time

²⁵⁵ *Akzo Nobel Coatings, Inc. v. Dow Chem. Co.*, 811 F.3d 1334, 1342 (Fed. Cir. 2016).

²⁵⁶ *Id.* (citation omitted).

²⁵⁷ *See Toro Co. v. White Consol. Indus., Inc.*, 266 F.3d 1367, 1369–70 (Fed. Cir. 2001) (citation omitted), *aff'd*, 383 F.3d 1326 (Fed. Cir. 2004).

²⁵⁸ Preliminary injunction; Summary judgment (patentee); Summary judgment (accused infringer); Jury trial; Bench trial; JMOL (patentee); JMOL (accused infringer); Summary judgment (Both); Pleading on DOE (P); Declaratory judgment (AI); Rule 11.

Conventional wisdom holds that “summary judgment is now the most likely method of disposition for patent cases.”²⁵⁹ To prevail, patentees had “to provide particularized testimony and linking argument to show the equivalents.”²⁶⁰ Conversely “[g]eneralized testimony as to the overall similarity between the claims and the accused infringer’s product or process will not suffice.”²⁶¹ These requirements assure that the fact-finder does “not, under the guise of applying the doctrine of equivalents, erase a plethora of meaningful structural and functional limitations of the claim on which the public is entitled to rely in avoiding infringement.”²⁶² However, courts will reject motions for summary judgment when there is conflicting expert testimony on the application of the “function-way-result” or “insubstantial differences test.”²⁶³

The Supreme Court acknowledged concerns “over unreviewability due to black-box jury verdicts.”²⁶⁴ As a form of “procedural improvement[],” it encouraged district courts to grant summary judgment for the defendant where “no reasonable jury could determine two elements to be equivalent,” or where “legal limitations on the application of the doctrine of equivalents are to be determined by the court, either on a pretrial motion for partial summary judgment or on a motion for judgment as a matter of law . . .”²⁶⁵ In this way, a trial judge could intercept an issue before it got to the jury by determining that the “all-elements” rule or one of the doctrine’s limits barred its application.²⁶⁶ Indeed, as one court put it, a court “not only has the discretion, but is in fact required to grant summary adjudication in any case where no reasonable fact finder could

²⁵⁹ White, *supra* note 195, at 786.

²⁶⁰ AquaTex Indus., Inc. v. Techniche Sols., 479 F.3d 1320, 1329 (Fed. Cir. 2007).

²⁶¹ Tex. Instruments, Inc. v. Cypress Semiconductor Corp., 90 F.3d 1558, 1567 (Fed. Cir. 1996), *cert. denied*, 520 U.S. 1228 (1997).

²⁶² Perkin-Elmer Corp. v. Westinghouse Elec. Corp., 822 F.2d 1528, 1532 (Fed. Cir. 1987).

²⁶³ See e.g., Crown Packaging Tech., Inc. v. Rexam Bev. Can Co., 559 F.3d 1308, 1315 (Fed. Cir. 2009) (conflicting expert evidence regarding function establishes material issue of fact), *rev'd*, 635 F.3d 1373 (2011).

²⁶⁴ Warner-Jenkinson Co. v. Hilton Davis Chemical Co., 520 U.S. 17, 42 n.8 (1997).

²⁶⁵ *Id.*

²⁶⁶ PrinterOn Inc. v. BreezyPrint Corp., 93 F. Supp. 3d 658, 691 (S.D. Tex. 2015) (“Although infringement under the doctrine of equivalents is a fact question, a court may determine as a matter of law that the ‘all limitations’ rule, the prior art, or prosecution history estoppel preclude the claim.”).

find equivalence even if equivalence is a factual matter normally reserved for the jury.”²⁶⁷

The data shows that motions for summary judgment brought by accused infringers were indeed by far the most dominant procedural posture (57%) followed distantly by bench trials (12%) and summary judgement motions brought by both parties (12%). Accused infringers won 70% of district court cases and 77% of Federal Circuit cases when they brought summary judgment, comparable with the Allison-Lemley study (“approximately two-thirds”).²⁶⁸ This shows that seeking summary judgment is clearly a winning strategy for accused infringers.

Summary judgment motions brought by patentees were uncommon (3%). The Allison-Lemley study provides a clue as to why. The authors observed that:

Even under the relatively permissive doctrine of equivalents rules in place before 2000, equivalents claims usually failed, most often on summary judgment. That became even more true after 2000, and the Supreme Court’s 2002 decision didn’t change the trend. In fact, district courts are more likely to reject doctrine of equivalents claims today than ever before.²⁶⁹

Their data showed that courts applied the doctrine of equivalents routinely until between the mid-1990s and mid-2000s, during which a dramatic shift occurred.²⁷⁰ In 1996, the Supreme Court held that claim interpretation, or a *Markman* hearing, as it would be called, was an issue for the judge, not the jury.²⁷¹ Claim construction is relatively easier to use and reduces the unpredictability of jury trials by shifting the determination to judges. Moreover, once judges rule on claim construction, they want to resolve the entire dispute since judges constructing claims know the accused products’ structures.²⁷² This allows them to settle on a broader construction to avoid having the jury contend with the doctrine.²⁷³

²⁶⁷ Dahl v. Swift Distributions, Inc., 757 F. Supp. 2d 976, 982 (C.D. Cal. 2010).

²⁶⁸ Allison & Lemley, *supra* note 4, at 971, app. at 981 tbl.2.

²⁶⁹ *Id.* at 958.

²⁷⁰ *Id.*; Petherbridge, *supra* note 1, at 1378–79; Lee Petherbridge, *The Claim Construction Effect*, 15 MICH. TELECOMM. & TECH. L. REV. 215, 233 (2008).

²⁷¹ *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 391 (1996); *see also* Schwartz, *supra* note 4, at 1179 (“[T]he displacement of the doctrine of equivalents, which led to its decreasing importance, occurred after *Markman I*, well before any direct assaults on the doctrine in these cases.”).

²⁷² Allison & Lemley, *supra* note 4, at 958.

²⁷³ Schwartz, *supra* note 4, at 1181 (“[C]ourts may have found these doctrines to be substitutes for each other. . . . [C]laim construction has arguably expanded to

Patentees won 40% of cases at the district court and won only one case in two appeals heard by the Federal Circuit involving a patentee-initiated summary judgment. The Allison-Lemley study reported that patentees won 55.6% of cases when they filed.²⁷⁴ Interestingly, two Rule 11 cases involved the doctrine of equivalents; these arose in the context of clients accusing their attorneys of malpractice.²⁷⁵

CONCLUSION

The doctrine of equivalents enables patentees to ensnare defendants' inventions when they are similar, but only if those differences are insubstantial. In every case, judges must straddle a difficult balance between two competing policy goals. The first is fairness to patentees by giving them the full scope of their patent claims. The second is predictability to the public by giving them full notice of what patentees have claimed.

By coding the reported data and reasoning in each case, this Article reveals that the doctrine of equivalents experienced a recent revitalization—unnoticed and unproven until now. Among the multitude of results, some key findings include the rise and fall of industries and tests applied; the dominance of specific litigation venues and postures as well as patentee and alleged infringer win rates; the dynamics at the Federal Circuit; which judges dominate as well as affirmance and reversal rates; and, finally, the tests and limits applied. These findings are informative to practitioners and academics alike. This Article provides an empirical basis for judges, scholars, policymakers, and patent attorneys to better understand the doctrine's nature in order to contextualize its evolution and chart its future.

Looking ahead, future studies on the doctrine of equivalents could look at a host of subjects informed by this Article's dataset and findings. Some include: is the doctrine of equivalents

encompass the doctrine of equivalents."); *Id.* ("[J]udges quickly decided the doctrine of equivalents under the guise of summary judgment to keep the case from the jury."); *Id.* at 1182 ("Judges who held separate hearings may have been more likely to learn the technology and have a greater desire to dispose of the case in its entirety after claim construction."); Allison & Lemley, *supra* note 4, at 958 ("That dataset bears out our hypothesis. The doctrine of equivalents was alive and well before *Markman* but has been in decline ever since.").

²⁷⁴ Allison & Lemley, *supra* note 4, at 984.

²⁷⁵ *Touchcom, Inc. v. Bereskin & Parr*, 790 F. Supp. 2d 435, 439 (E.D. Va. 2011); *Vehicle Operation Techs. LLC v. Am. Honda Motor Co. Inc.*, 67 F. Supp. 3d 637, 641 (D. Del. 2014).

uncertain and if so, how courts mitigate that uncertainty?; does the Priest-Klein hypothesis influence doctrine of equivalents cases more than other types of cases and if so, why?; more granular studies breaking down to the dataset further to look at individual district courts; the impact of equity on case outcomes; the impact of pioneer inventions; and how mean-plus-function claims intersect with the doctrine of equivalents. More broadly, just as the Allison-Lemley study helped provide an important launchpad for this Article, this Article will inform other studies on patent, trademark, and copyright law looking at similar infringement factors. In this sense, all articles that have gone before are notes for other papers and thinking drafts. And that is as it should be.