

EXPLAINING THE DEMISE OF THE DOCTRINE OF EQUIVALENTS

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I. INTRODUCTION

Over 150 years ago, the Supreme Court expanded the potential scope of patents by adopting a doctrine to prevent “substantial copies” of an invention by providing coverage over inventions that are “equivalent” to that patented.¹ The doctrine of equivalents had been consistently applied by courts until its rapid “demise” between the mid-1990s and the mid-2000s.

In recent years, distinguished academics have studied the so-called “demise” of the doctrine of equivalents. Professors John Allison, Mark Lemley, and Lee Petherbridge have each empirically analyzed this doctrine. All of their studies conclude that successful use of the doctrine has substantially diminished over time.² With very little detail or support, Allison and Lemley speculated that trial court judges caused the death of the doctrine of equivalents after they were tasked with construing the scope of patent

1. *Winans v. Denmead*, 56 U.S. 330 (1853).

2. John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955, 958 (2007); Lee Petherbridge, *On the Decline of the Doctrine of Equivalents*, 31 CARDOZO L. REV. 1371, 1378–79 (2010) [hereinafter Petherbridge, *Doctrine of Equivalents*]; Lee Petherbridge, *The Claim Construction Effect*, 15 MICH. TELECOMM. & TECH. L. REV. 215, 233 (2008) [hereinafter Petherbridge, *Claim Construction Effect*].

claims in *Markman v. Westview Instruments*.³ They contended that if trial judges learned the technology and ruled against the patentee on claim construction,⁴ they desired to resolve the entire dispute, which required adjudicating the equivalents claim against the patentee as well.⁵ Petherbridge offered a different theory. He provided evidence that the decline occurred years after *Markman*, only after a significant Supreme Court decision on the doctrine of equivalents, *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*,⁶ which reduced the applicability of the doctrine.⁷ While each of these researchers noted that the doctrine of equivalents had decreased in its successful use and provided some grounds for the decrease, none clearly explained why. As such, the cause and precise mechanism behind the so-called “demise” of the doctrine of equivalents have largely been mysterious.

This Article sheds light on the mystery by providing a novel theoretical model and extensive empirical evidence to explain the decline of the doctrine. In large part, the demise occurred as a result of two complementary forces discussed for the first time in this Article: “doctrinal reallocation” and “doctrinal displacement.”⁸

Appellate courts have the power to engage in “doctrinal reallocation” by altering adjudicatory control of a doctrine. Control can be regulated in numerous ways. For example, the decision-maker tasked with adjudicating the doctrine in question can be shifted at the trial-court level from the jury to the judge, or vice-versa. Or, the appellate court may increase its control by reviewing lower court decisions de novo instead of under a clearly erroneous standard. These are forms of “doctrinal reallocation.” Once control of a doctrine increases, a higher court may alter the prominence of the doctrine in the adjudicatory process. When a judge instead of a jury makes a decision, cases are more easily resolved by summary judgment and readily reviewed on appeal. Lowering the deference in appellate review permits the higher court to more easily correct decisions with which it disagrees.

3. Allison & Lemley, *supra* note 2, at 958; see *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 978 (Fed. Cir. 1995) (en banc) (overruling precedent permitting juries to construe patent claims), *aff'd*, 517 U.S. 370 (1996).

4. Claim construction refers to the process of determining the literal scope of a patentee’s rights.

5. Allison & Lemley, *supra* note 2, at 958.

6. 535 U.S. 722 (2002).

7. Petherbridge, *Doctrine of Equivalents*, *supra* note 2, at 1391–92.

8. For a broader discussion of these new theories, see David L. Schwartz & Ted M. Sichelman, *Doctrinal Displacement* (2011) (unpublished manuscript), available at <http://ssrn.com/abstract=1832705>.

Reallocating a doctrine to a judge does more than simply empower a court to profoundly influence the importance of that doctrine—there are further-reaching consequences. A change in the importance of a given doctrine may lead to the decline of other, typically related, doctrines in the same field of law. These “displaced” doctrines may have been extremely important prior to being dislodged.

The theories of doctrinal reallocation and displacement explain the chain reaction resulting in the demise of the doctrine of equivalents. Initially, the Court of Appeals for the Federal Circuit reshaped patent litigation in *Markman*. There, it overruled previous precedent and held that claim construction was an issue of law that should be exclusively examined by a judge rather than a jury.⁹ Shortly thereafter, the Federal Circuit in *Cybor Corp. v. FAS Technologies* ruled that claim construction should be reviewed by the appellate court using the expansive de novo standard.¹⁰ These decisions triggered significant changes in patent litigation, not only in connection with claim construction, but also with respect to the doctrine of equivalents. Claim construction, which was significant but not critical before these decisions, rapidly became the centerpiece of patent litigation. Nearly contemporaneously, the doctrine of equivalents declined in importance. In effect, these doctrines switched places in terms of significance as a judicial tool. This switch occurred, in part, because both doctrines are essentially substitute ways for the court to evaluate the proper reach of an invention. When one means of evaluating scope—claim construction—became relatively easier for the court to apply, courts began to rely upon it more. As a result of this shift, patent litigation today is far different than litigation in the early 1990s.

The purpose of this Article is two-fold. Testing the theories of doctrinal reallocation and doctrinal displacement, the Article first presents evidence that doctrinal reallocation occurred in patent litigation in the wake of *Markman*. In the aftermath of that reallocation, the Federal Circuit increased the importance of claim construction in patent litigation. This observation, based in part on empirical data, highlights the ability of the court to shape patent law after reallocating the responsibility for claim construction to the judge.

9. Allison & Lemley, *supra* note 2, at 978; *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 978 (Fed. Cir. 1995) (en banc) (overruling precedent permitting juries to construe patent claims), *aff'd*, 517 U.S. 370 (1996).

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

Second, the Article examines the demise of the doctrine of equivalents in the lens of doctrinal displacement.¹¹ Specifically, this Article provides empirical evidence showing that the rise in the importance of claim construction foreshadowed a sharp decline in the importance of the doctrine of equivalents. Reducing the significance of the doctrine of equivalents was in line with the Federal Circuit's goal of curbing the unpredictability of patent jury trials.

This Article has four additional Parts. Part II explains the theory of doctrinal reallocation and displacement in the context of adjustments to claim construction and the doctrine of equivalents by the Federal Circuit. Part III describes the empirical study design and methodology. Part IV propounds hypotheses about the expected effect of *Markman* and *Cybor* on patent litigation and the expected demise of the doctrine of equivalents. It also delivers empirical results relating to the displacement of the doctrine of equivalents in patent law. Part V concludes with some brief remarks about the significance of the findings.

II. THEORY

Doctrinal reallocation¹² and doctrinal displacement¹³ may occur in almost any area of law. Scholars have recognized that a shift in decision-making authority from jury to judge (and vice-versa) can alter substantive doctrine,¹⁴ but they have yet to provide a formal theory to explain this jurisprudential phenomenon. This Article provides such a theory and tests it with data in the

11. Although the doctrine of equivalents and claim construction both affect the ultimate reach of a given patent claim, they are separate doctrines. *See* *Tate Access Floors, Inc. v. Interface Architectural Res., Inc.*, 279 F.3d 1357, 1367 (Fed. Cir. 2002) (“The doctrine of equivalents expands the reach of claims beyond their literal language.”). However, others have noted that the doctrine of equivalents and claim construction overlap. *See, e.g.*, Kevin Emerson Collins, *The Reach of Literal Claim Scope into After-Arising Technology: On Thing Construction and the Meaning of Meaning*, 41 CONN. L. REV. 493 (2008) (arguing that courts at times allow literal claim scope to grow to encompass after arising technologies, a task traditionally performed by the doctrine of equivalents).

12. Doctrinal reallocation refers to reallocating the responsible decision-maker for a doctrine. It is a loose analogy to asset reallocation. In asset reallocation, a portfolio is adjusted among different asset classes to reduce risk.

13. Doctrinal displacement refers to displacing one doctrine with another. *See infra* Section II.B.

14. For a review of the history of legal realists and their views on procedure, see NEIL DUXBURY, *PATTERNS OF AMERICAN JURISPRUDENCE* 55–169 (1995); see also Frank B. Cross, *Legal Process, Legal Realism and the Strategic Political Effects of Procedural Rules 2* (Univ. of Tex. Sch. of Law, Law & Econ. Working Paper No. 065, 2005), available at <http://ssrn.com/abstract=837665> (“Realists argue that the apparently neutral procedural requirements are created or applied precisely for their ideological implications.”).

context of the Federal Circuit, which reviews nearly all appeals involving issues of patent law.¹⁵ This Part briefly explains the theories of doctrinal reallocation and doctrinal displacement using two doctrines from patent law: claim construction and the doctrine of equivalents.

A. DOCTRINAL REALLOCATION AT THE FEDERAL CIRCUIT

There are many reasons why a court may wish to increase the importance of a doctrine. Typically the change is made because the court wants to implement an institutional preference. These institutional preferences often are designed to reduce the uncertainty of litigation outcomes—in other words, courts aim to improve the predictability and stability of the adjudicatory process. Separately, courts are worried about institutional legitimacy and fairness. Alternatively, courts may have concerns about excessive caseloads, and they raise the significance of a doctrine to permit swifter resolution of lawsuits.

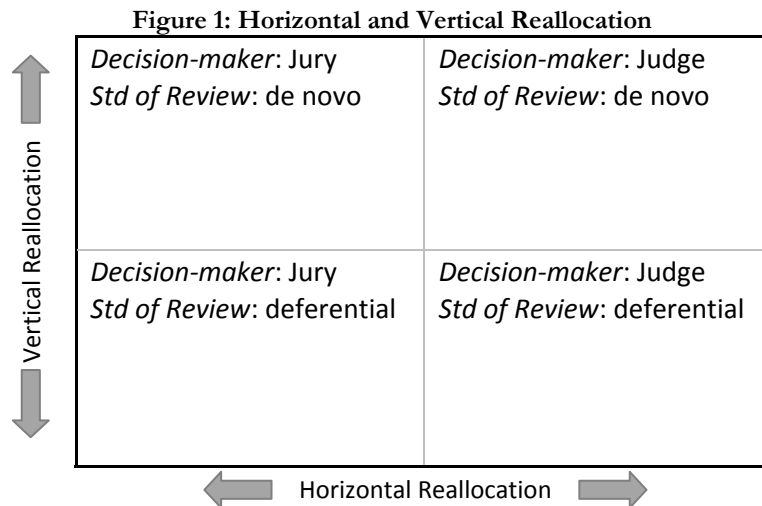
Before discussing the theory in detail, several terms must be defined. First, this Article uses “importance” of a doctrine to mean how central a doctrine is to an area of law, including, for example, how often it is raised and how often it is dispositive of the entire dispute.¹⁶ Second, “control” refers to the ability of judges to determine the importance of a doctrine not just for a given case, but for an area of law as a whole. The importance of the doctrine may change with or without changing the substance of the underlying law.

Any court can alter the importance of a doctrine by various procedural mechanisms. Through these procedural mechanisms, examples of which are described *infra*, district and appellate judges can change the quantum of their control over the doctrine. One final note about jurisprudential control is appropriate. Increased control over a doctrine does not always lead to the doctrine becoming more important. Rather, control provides courts with the *ability* to make the doctrine more or less important. The direction of importance, either increased or decreased, is typically dictated by the court’s overall institutional goal. If the goal is to lighten judicial workload, for example, the court may increase the importance of a statute of limitations. Alternatively, if the goal is to heighten predictability, the court may decrease the importance of an unstructured jury doctrine.

15. 28 U.S.C. § 1295(a) (2006); *Holmes Grp., Inc. v. Vornado Air Circulation Sys., Inc.*, 535 U.S. 826, 829 (2002).

16. This Article analyzes various aspects of judicial decisions to evaluate importance, necessarily making the assumption that these decisions are a good measure of the centrality of an issue to the universe of disputes including unlitigated disputes.

Judges can increase or decrease their control over a doctrine in several fashions. One method is to “reallocate” the decision-making authority over a particular doctrine among various institutional actors. “Horizontal” reallocation refers to shifts of authority within the trial court—for example, between the judge and jury. “Vertical” reallocation refers to shifts of authority between upper and lower courts—for instance, by changing the standard of review on appeal. Horizontal reallocation and vertical reallocation are depicted in the two-by-two matrix shown in Figure 1, *infra*.¹⁷



Within the trial court, decision-making responsibility is divided between the jury and the judge. In Figure 1, judges have more control when the district court judges are the decision-makers (shown on the right) than when the juries are the decision-makers (shown on the left).¹⁸ Horizontal reallocation alters the control over the shifted issue. Judicial determination of an issue provides more control to judges. Judges are repeat players in litigation and hear the same issue more than a jury selected and seated for a single case. Of course, the Seventh Amendment bounds horizontal

17. To fit reallocation into a simple two-by-two matrix, all deferential standards of review are denoted as the same. In reality, there is a difference between the types of deferential review such as substantial evidence and clear error. *E.g.*, Frank B. Cross, *Decisionmaking in the U.S. Circuit Courts of Appeals*, 91 CALIF. L. REV. 1457, 1502–03 (2003).

18. Changing the decision-maker on an issue between judge and jury is not a substantive doctrinal shift per se. *See* Emerson H. Tiller & Frank B. Cross, *What Is Legal Doctrine?*, 100 NW. U. L. REV. 517, 517 (2006) (noting that doctrine comprises “[j]udicial opinions [that] create the rules or standards”). The underlying substantive *doctrine* on the shifted issue remains unchanged. In other words, the rules or standards are unchanged; it is the evaluator of these rules or standards who changes.

reallocation, and more specifically, the extent to which issues may be recalled from the jury.¹⁹

Vertical reallocation involves control within the hierarchy of the judicial system, namely between lower courts and upper courts. Not all aspects of a trial court judgment are reviewed on appeal with the same scrutiny. Courts use the standard of review to differentiate among the various appealed matters.²⁰ The most permissive standard of review from the perspective of a higher court—*de novo*—permits the upper court to review the matter without deference.²¹ *De novo* (shown on the top in Figure 1) provides the most control for the higher court because it can freely revise findings from the court below.²² Other standards of review such as clearly erroneous or abuse of discretion (shown on the bottom in Figure 1) provide more control to the lower court because the upper court cannot modify the lower decisions unless there is clear error.

1. *The Claim Construction Doctrine*

In the mid-1990s, the Federal Circuit desired to make patent law more predictable.²³ Consequently, this Article argues, the Federal Circuit elevated the importance of one aspect of patent litigation: claim construction. Claim construction refers to the process of determining the literal scope of a

19. The Seventh Amendment states: “In Suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any Court of the United States, than according to the rules of the common law.” U.S. CONST. amend. VII.

20. Amanda Peters, *The Meaning, Measure, and Misuse of Standards of Review*, 13 LEWIS & CLARK L. REV. 233, 240 (2009) (“If appellate courts examine all of the decisions made below without any deference to rulings, then the trial court’s proceedings are meaningless. However, a deferential standard of review not only works to preserve the integrity of the trial court, it also serves to protect the appellate court’s valuable time and resources.”).

21. *Id.* at 246 (“Courts using *de novo* review examine the trial court’s application of the law without affording the lower court discretion.”).

22. Admittedly, very little if anything falls within the top-left box.

23. See Paul R. Michel, *The Challenge Ahead: Increasing Predictability in Federal Circuit Jurisprudence for the New Century*, 43 AM. U. L. REV. 1231, 1235 (1994) (“I therefore argue that our court works best when it so defines generic legal rights that, in most individual situations, the parties to a potential lawsuit could, if willing, reason together and agree on the likely outcome of prospective litigation. Specifically, the parties’ lawyers could reliably predict how our court would ultimately rule on the matter in dispute. Surely, moving in the opposite direction—toward more uncertainty of rights, more unpredictability of adjudicatory outcomes, and therefore more lawsuits—is an undesirable and ultimately an unsustainable result.”). Obviously, there are limits to how predictable patent law can be, especially given that it must apply to currently undiscovered technologies.

patentee's rights.²⁴ The word "construction" in claim construction refers to interpreting the meaning of the words used in a patent claim.²⁵ Claim construction occurs in various contexts, and perhaps most prominently in litigation.²⁶

The law of claim construction is embodied in a series of canons of construction, which are similar to the canons of statutory construction.²⁷ The Federal Circuit believed that claim construction was key to making patent law

24. *Abbott Labs. v. Sandoz, Inc.*, 544 F.3d 1341, 1358–60 (Fed. Cir. 2008) (“‘Claim construction’ is for the purpose of explaining and defining terms in the claims, and usually requires use of words other than the words that are being defined.”). The word “claim” in claim construction refers to the claims of the patent. All patents contain at least one and typically multiple claims. John R. Allison & Mark A. Lemley, *The Growing Complexity of the United States Patent System*, 82 B.U. L. REV. 77, 103 (2002) (reporting that a random sample of patents issued between 1996 and 1998 had an average of 14.87 claims per patent). The claims are each a single sentence written in a technical manner. See U.S. PATENT & TRADEMARK OFFICE, U.S. DEP’T OF COMMERCE, MANUAL OF PATENT EXAMINING PROCEDURE (MPEP) § 706.03(d) (8th ed. Rev. 8, July 2010). The U.S. Patent Office (Patent Office) has detailed formatting and structural rules that apply to claims. *Id.* §§ 608.01(i)–.01(o). The exact language in the claims is carefully considered by patent attorneys and the Patent Office. Patent attorneys spend substantial time selecting the language to use in patent claims. Jason M. Okun, *To Thine Own Claim Be True: The Federal Circuit Disaster in Exxon Chemical Patents, Inc. v. Lubrizol Corp.*, 21 CARDOZO L. REV. 1335, 1341 (2000) (“It is in the process of drafting the claim that the most crucial and close communication occurs between the claim drafter and the inventor.”). The Patent Office substantively examines a patent application to confirm that it meets the requirements for a patent (including utility, patentable subject matter, novelty, non-obviousness, written description, enablement, and best mode). During examination, the Patent Office considers the precise claim language chosen by the patent applicant. The claims define the outer limit of the patentee’s rights. 35 U.S.C. § 271 (2006); Jeanne C. Fromer, *Claiming Intellectual Property*, 76 U. CHI. L. REV. 719, 731 (2009) (“[C]laiming communicates the set to the public to encourage efficient investment in the invention, by requiring licensing or abstinence from the set’s embodiment and by permitting free use of embodiments not in the set.”).

25. *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1580 (Fed. Cir. 1991) (“[T]he construction of claims is simply a way of elaborating the normally terse claim language: in order to understand and explain, but not to change, the scope of the claims.”).

26. In litigation, it is common for the parties to disagree on the meaning of a particular word or phrase used in a patent claim. Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1751 (2009) (“[T]here is essentially always a dispute over the meaning of the patent claims.”).

27. KIMBERLY A. MOORE, PAUL R. MICHEL & TIMOTHY R. HOLBROOK, PATENT LITIGATION AND STRATEGY 287–311 (3d ed. 2008) (discussing canons of claim construction); see also Timothy R. Holbrook, *Substantive Versus Process-Based Formalism in Claim Construction*, 9 LEWIS & CLARK L. REV. 123, 144–45 (2005); Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035, 1047 n.43 (2003) (“Like canons of statutory construction, canons of claim construction assist the court in interpreting language consistently.”).

more predictable.²⁸ If companies know *ex ante* whether their activities infringe on the rights of another, they can plan accordingly.²⁹ They can rationally decide whether or not to engage in an activity after evaluating the risks.³⁰ They can invest in “design around” solutions that add to the storehouse of available technologies. A lack of predictability results in companies not knowing with reasonable certainty whether their activities infringe upon the rights of another,³¹ which limits their ability to avoid infringement in the first place.³² This uncertainty arguably leads to a loss of efficiency, because some companies may avoid making new products altogether to eliminate the risk of liability, or pay damages unnecessarily when they otherwise could have designed to avoid infringement.³³ To alleviate this problem, in the mid-1990s the Federal Circuit focused on making patent law more efficient and predictable; to do so, this Article argues, the Federal Circuit decided to make claim construction more important.³⁴

It is interesting that the Federal Circuit focused on claim construction as a means of introducing greater certainty. This may have been because claim construction serves a gatekeeper function in infringement suits: before infringement may be determined, the claim must first be construed.³⁵ Furthermore, many invalidity defenses require claim construction as a first step. Examples include whether the invention is novel,³⁶ obvious,³⁷ or patentable subject matter.³⁸ As a result, claim construction affects a variety of other issues, especially those decided much later in the case. In other words,

28. See *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1473 (Fed. Cir. 1998) (Rader, J., dissenting in part) (“By removing lay juries from complex technological decisions, these decisions promised to improve the predictability and uniformity of patent law.”).

29. See JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE* 46–48 (2008).

30. See *id.* at 6–8.

31. *Id.*

32. *Id.* at 70–72.

33. *Id.*

34. See John R. Thomas, *Formalism at the Federal Circuit*, 52 AM. U. L. REV. 771, 774–75 (2003) (arguing that the Federal Circuit has used formalism in an effort to make patent law more certain and predictable).

35. *Merck & Co. v. Teva Pharm. USA, Inc.*, 347 F.3d 1367, 1369 (Fed. Cir. 2003) (“In determination of patent infringement, as the first step the claims are construed; then, the construed claims are compared to the alleged infringing device.”).

36. *Helifix Ltd. v. Blok-Lok, Ltd.*, 208 F.3d 1339, 1346 (Fed. Cir. 2000) (“The first step of an anticipation analysis is claim construction.”).

37. *E.g.*, *Sys. Div., Inc. v. Teknek LLC*, 59 F. App’x 333, 338 (Fed. Cir. 2003) (citing *Smiths Indus. Med. Sys., Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1353 (Fed. Cir. 1999)) (“The first step in an obviousness analysis is to construe the language of the claims.”).

38. See, *e.g.*, *In re Nuijten*, 500 F.3d 1361, 1352 (Fed. Cir. 2007) (construing patent claims before considering whether the claims were patentable subject matter).

a change in the salience of claim construction may impact issues decided after and reliant upon claim construction.³⁹

2. *Reallocation of the Claim Construction Doctrine*

In the early 1990s, claim construction was largely performed by juries.⁴⁰ Using jury instructions, the judge would instruct the jury on the tools to determine the proper claim construction.⁴¹ The judge would include information on the canons of claim construction, but the jury would be responsible for applying the canons. The judge still maintained some modicum of control through post-trial motions⁴²: if the judge believed that the jury's verdict was unsupported or in substantial error, the judge could always grant judgment as a matter of law.⁴³

Figure 2 illustrates the status of claim construction in the early 1990s, prior to *Markman* and *Cybor*.

39. The Federal Circuit initially focused on claim construction rather than the doctrine of equivalents to increase predictability. Claim construction is largely based upon the “four corners” of the patent (and the associated prosecution history). In contrast, the doctrine of equivalents is based on a variety of factors, including the patent, prosecution history, and the operation and structure of the accused device. The court must have believed that it could more easily use claim construction to arrive at definite and foreseeable results.

40. Edmund J. Sease, *Markman Misses the Mark, Miserably*, 2004 J.L. TECH. & POL'Y 99, 101 (“The jury was allowed to hear all the evidence and then decide what the term ‘absorbent’ meant factually in the context of the invention. This was the state of the Federal Circuit in 1984. . . . Since *Markman* in 1996, juries are no longer allowed to determine the meaning of a patent claim.”).

41. *See, e.g.*, *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1566 (Fed. Cir. 1997) (recounting detailed jury instructions provided to construe a means-plus-function claim limitation).

42. In fact, in the famous *Markman* case, the trial judge entered judgment as a matter of law for the accused infringer after the jury had found for the patentee. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 973 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996).

43. FED. R. CIV. P. 50.

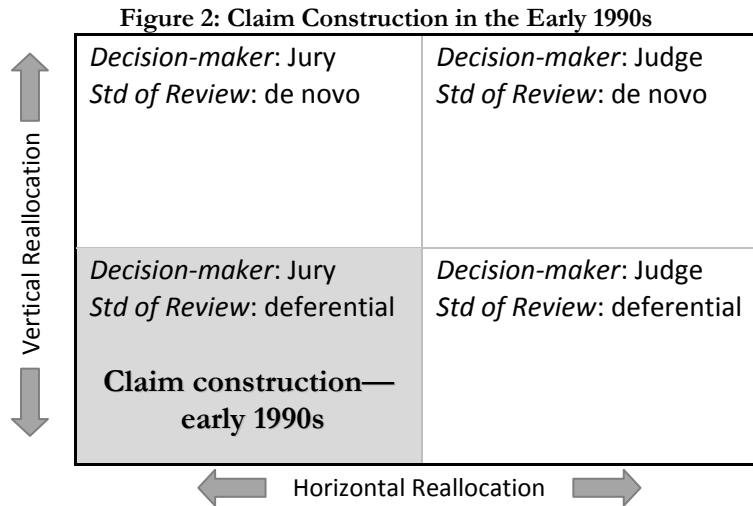


Figure 2 places claim construction in the early 1990s as a doctrine evaluated by the jury and reviewed on appeal with some deference. However, the figure slightly oversimplifies the state of patent litigation, for even in the early 1990s, district court judges interpreted claims in some instances.⁴⁴ For example, district court judges granted summary judgment in some patent cases.⁴⁵ To decide summary judgment, the court construed the claims and compared the properly construed claims to the accused product or method, granting all inferences to the non-moving party.⁴⁶ Judges also construed patent claims when deciding motions for preliminary injunctions, a form of equitable relief reserved only for the court.⁴⁷ Moreover, judges conducted bench trials of patent cases without a jury demand, and in doing so construed patent claims.⁴⁸ But, in general, in the early 1990s, claim construction was the province of the jury.⁴⁹

44. It should be noted that before the late 1980s, there were fewer jury demands and most patent cases were bench trials. *See* Kimberly A. Moore, *Jury Demands: Who's Asking?*, 17 BERKELEY TECH. L.J. 847, 850–51, 851 fig.1 (2002).

45. *See, e.g.*, *Int'l Visual Corp. v. Crown Metal Mfg.*, 991 F.2d 768 (Fed. Cir. 1993).

46. *See, e.g.*, *UTStarcom, Inc. v. Starent Networks, Corp.*, No. 07-CV-2582, 2009 WL 3122554, at *7 (N.D. Ill. Sept. 22, 2009) (“At the summary judgment stage, the accused device is compared to the construed claims to determine whether there is a genuine issue of material fact.”).

47. *See, e.g.*, *Devon Indus., Inc. v. Am. Med. Mfg.*, 19 F.3d 39 (Fed. Cir. 1994); *Al-Site Corp. v. Cable Car Sunglasses*, 911 F. Supp. 410 (N.D. Cal. 1994).

48. *See, e.g.*, *Conopco, Inc. v. May Dep't Stores*, 46 F.3d 1556 (Fed. Cir. 1994).

49. Jeffrey Peabody, *Under Construction: Towards a More Deferential Standard of Review in Claim Construction Cases*, 17 FED. CIR. B.J. 505, 506 (2008) (“Prior to 1995, claim construction issues were typically decided by the jury.”).

At a recent conference, Federal Circuit Judge Jay Plager revealed some information about the Federal Circuit's thinking about claim construction just before the mid-1990s.⁵⁰ According to Judge Plager, the Federal Circuit was concerned about the lack of transparency and the "black box" nature of the jury process, particularly with regards to claim construction. To reverse this problem, the Federal Circuit made major changes in the process of claim construction between 1995 and 1998. None of the changes affected the substantive claim construction doctrine. Instead, the Federal Circuit reallocated the responsibility for claim construction that had rested in juries entirely to judges. The reason for this reallocation can be gleaned from the judicial opinions themselves. The Federal Circuit held that "it is only fair . . . that competitors be able to ascertain to a reasonable degree the scope of the patentee's right to exclude."⁵¹ The Federal Circuit further stated that "competitors should be able to rest assured . . . that a *judge*, trained in the law, will . . . apply the established rules of construction, and in that way arrive at the true and consistent scope of the patent owner's rights to be given legal effect."⁵²

Horizontal and vertical reallocation in patent law began in April 1995 when the Federal Circuit issued its en banc decision in *Markman v. Westview Instruments (Markman I)*.⁵³ *Markman I* held that claim construction was exclusively reserved for the judge.⁵⁴ The majority acknowledged that there were two lines of cases in the Federal Circuit claim construction precedent, one holding that "claim construction may have underlying factual inquiries that must be submitted to a jury,"⁵⁵ and the second holding that claim construction "is strictly a question of law for the court."⁵⁶ The Federal Circuit found that the first line was incorrect and should be abandoned because it had no firm basis in Federal Circuit precedent.⁵⁷ The Federal

50. Judge S. Jay Plager, Comments at the Loyola of Los Angeles Law Review Symposium: The Federal Circuit as an Institution (Oct. 30, 2009).

51. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 978 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996).

52. *Id.* at 979 (emphasis added). To be fair, the Federal Circuit is not a single monolithic court. For example, there were three judges who declined to join in the *Markman* majority, Judges Mayer and Rader (concurring) and Judge Newman (dissenting).

53. *Id.*

54. *Id.* at 979 ("We therefore settle inconsistencies in our precedent and hold that in a case tried to a jury, the court has the power and obligation to construe as a matter of law the meaning of language used in the patent claim.").

55. *Id.* at 976.

56. *Id.* at 976–77.

57. *Id.* at 977–78.

Circuit also found that claim construction must be reviewed de novo when raised in an appeal.⁵⁸

The next year, the Supreme Court unanimously affirmed the Federal Circuit's *Markman I* holding, but on somewhat different reasoning (*Markman II*).⁵⁹ The Supreme Court supported the Federal Circuit, stating that claim construction is "exclusively within the province of the court."⁶⁰ After deciding that no Supreme Court precedent controlled the issue, the Court decided to "consider both the relative interpretive skills of judges and juries and the statutory policies that ought to be furthered by the allocation."⁶¹ According to the Supreme Court, judges are more likely to properly construe a written instrument.⁶²

While the Supreme Court in *Markman II* upheld that judges must construe claims (horizontal reallocation), it was silent on the standard of review of claim construction rulings (vertical reallocation). This silence by the Supreme Court led to some short term uncertainty with respect to the standard of review of claim construction. *Markman I* held that it was to be reviewed de novo.⁶³ *Markman II* was silent on this point.⁶⁴ Nonetheless, a majority of Federal Circuit claim construction opinions after *Markman II* found that claim construction was to be reviewed de novo.⁶⁵ However, a minority of cases concluded that there was a factual component to claim construction, and those facts were reviewed with deference.⁶⁶

In 1998, several years after *Markman II*, the Federal Circuit en banc decided *Cybor Corp. v. FAS Technologies*, which resolved the standard of review issue.⁶⁷ In *Cybor*, the Federal Circuit held that claim construction is purely a matter of law and should be reviewed de novo on appeal. The Federal Circuit stated that most panels after *Markman II* had followed the de novo

58. *Id.* at 979.

59. *Markman v. Westview Instruments, Inc. (Markman I)*, 517 U.S. 370 (1996).

60. *Id.* at 372.

61. *Id.* at 384.

62. *Id.* at 388–89.

63. *Markman I*, 52 F.3d at 975.

64. *Markman II*, 517 U.S. 370.

65. *See, e.g.*, *Alpex Computer Corp. v. Nintendo Co.*, 102 F.3d 1214 (Fed. Cir. 1996); *Instituform Techs., Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098 (Fed. Cir. 1996); *Gen. Am. Transp. v. Cryo-Trans, Inc.*, 93 F.3d 766 (Fed. Cir. 1996).

66. *See, e.g.*, *Eastman Kodak Co. v. Goodyear Tire & Rubber Co.*, 114 F.3d 1547, 1555–56 (Fed. Cir. 1997); *Serrano v. Telular Corp.*, 111 F.3d 1578, 1586 (Fed. Cir. 1997); *Wiener v. NEC Elecs., Inc.*, 102 F.3d 534, 539 (Fed. Cir. 1996); *Metaulics Sys. Co. v. Cooper*, 100 F.3d 938, 939 (Fed. Cir. 1996).

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

standard.⁶⁸ The Federal Circuit rejected the clearly erroneous standard.⁶⁹ Just as shifting the decision from jury to judge horizontally reallocated control to the judges, shifting the standard of review from deference to de novo vertically reallocated control from the trial courts to the appellate courts.

Patent litigation after *Markman* and *Cybor* is represented in Figure 3.

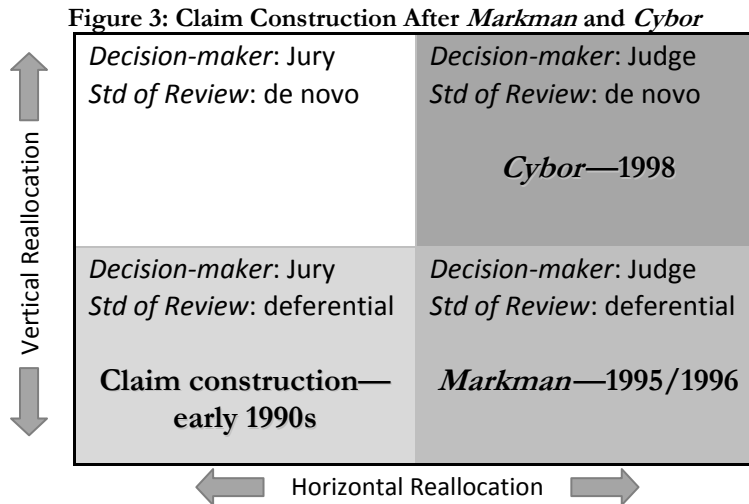


Figure 3 makes apparent the quick change in claim construction control. Within a three-year window, the Federal Circuit moved claim construction from the bottom left box in the matrix—weakest control by the court—to the top right box—greatest control by the court. *Markman I* clearly brought horizontal reallocation of claim construction,⁷⁰ moving it from the left box to the right box. A move in this direction gave trial court judges more control of the claim construction doctrine.⁷¹ *Cybor* resulted in vertical reallocation, as is evidenced by moving upward on the matrix as shown in Figure 3.⁷² By

68. *Id.* at 1454.

69. *Id.*

70. The Federal Circuit's 1995 en banc ruling reallocated the decision-maker for claim construction. The Supreme Court's decision merely affirmed. Consequently, the 1995 date is used as the date of reallocation in this Article.

71. It also should be noted that Figure 2 is an oversimplification. As noted by the Federal Circuit in *Markman I*, there was a split in authority before 1995. Some cases before *Markman I* had held that claim construction was for the judge. So while all of the post-*Markman* cases fall on the right side of Figure 3, a majority but not all of the pre-*Markman* cases fall on the left side.

72. *Markman I* also brought vertical reallocation to claim construction. However, *Markman II* created some uncertainty on the effectiveness of that reallocation. See *supra* note 66 and accompanying text. *Cybor* confirmed it.

using both horizontal and vertical reallocation, the Federal Circuit seized maximum control over the claim construction doctrine.⁷³

B. DOCTRINAL DISPLACEMENT IN PATENT LAW

Doctrinal reallocation generally results in elevating or diminishing the importance of a given doctrine. In turn, after one doctrine increases in importance, one or more other doctrines generally decrease in importance—in other words, they are “displaced” by the doctrine that became more prominent.⁷⁴

1. *Causes of Doctrinal Displacement*

There are three major causes of doctrinal displacement. First, there is a practical explanation: litigation constraints. Early in the life of a lawsuit, many claims and defenses are raised. After discovery progresses, the parties have an opportunity to explore the merits and strengths of their respective cases. Later, at critical moments in the lawsuit—for example, summary judgment, trial, and appeal—the parties typically focus their claims and defenses. Litigants understand that their chances of success increase if they focus their arguments on a few winnable points.⁷⁵ Raising multiple, weaker arguments dilutes the strength of the promising ones.⁷⁶ Word and page limits further

73. Figure 3 is a useful illustration of the changes occurring in the mid-1990s. However, the two-by-two matrix has a few limitations. For the purposes of illustration, each time period has been placed in a single box. As noted above, there were some Federal Circuit opinions in the early 1990s that reviewed claim construction de novo. *See, e.g., Oscar Mayer Foods Corp. v. ConAgra Inc.*, 45 F.3d 443 (Fed. Cir. 1994) (unpublished table decision). And after *Markman II* in 1996, most but not all of the Federal Circuit panels considered claim construction using the de novo standard. A very few cases were tried to juries before *Markman I* and decided on appeal after *Markman II*. For example, in *B. Braun Medical, Inc. v. Abbott Laboratories*, the entire case was submitted to a jury in 1994. 124 F.3d 1419 (Fed. Cir. 1997). The case was not decided by the Federal Circuit until 1997. *Id.* Almost all jury claim constructions had been settled or resolved by *Markman II*. Thus, perhaps *Markman* and *Cybor* should be considered together. Using this understanding, most of the cases after *Markman II* should be in the upper right box like those emphasized in Figure 3.

74. The corollary is that as one doctrine becomes less important, one or more other doctrines are usually enhanced.

75. Stephen Easton, *Losing Your Appeal*, 42 FED. LAW. 24, 31 (1995) (directing appellants to “choose the arguments that give you your best chances for success. Force yourself to pare the list to two or three strong grounds for reversal (or affirmance). Concentrate on them in both the briefs and the oral argument”).

76. *Id.* at 31 (“An attorney who swamps a judge with every possible argument runs the risk of causing the judge to miss the best arguments. If you throw a diamond into a mud pile, it starts to look pretty muddy.”).

push the parties to focus their claims and defenses.⁷⁷ Parties to an appeal are capped on the number of words permitted in the documents they submit to the court, and many district courts impose page limits on summary judgment or other important briefs. Litigation constraints are driven by the strategic decisions by the lawyers of which issues to develop and press.⁷⁸

When evaluating which issues to raise, litigants weigh at least two strategic considerations. First, litigants consider the likelihood of success on the merits of a given issue. Second, litigants consider whether the judge or jury will find the issue important in the context of the overall dispute. When one doctrine becomes more important, and consequently is raised more frequently, other doctrines will be raised less frequently. This displacement of other doctrines is normally diffuse. In each case, depending on the particular facts and circumstances, a different doctrine may be displaced. Alternatively, no doctrine may be displaced, and instead litigants may expand the force with which they argue a more limited number of points. Over a series of cases, no single doctrine is displaced directly. In these instances, multiple doctrines are displaced to a lesser degree, and the displacement proceeds largely unnoticed. However, the court can focus the displacement on one or several doctrines through additional case law. *En banc* decisions of an appellate court (or decisions of the Supreme Court) are particularly useful to displace a single doctrine.

The litigation constraints rationale may be particularly important with claim construction. In patent infringement lawsuits, there are frequently numerous potential claim construction disputes. As claim construction became more likely to be a critical and winnable issue, litigants often devoted several of their limited number of arguments to claim construction disputes. Devoting more to claim construction left far less room for other arguments and doctrines, thereby enhancing the displacement of other doctrines.

A second reason for doctrinal displacement is judicial constraints. District court judges have limited time and resources and, when appropriate, rely on summary judgment to expeditiously resolve lawsuits. When summary judgment is available on several possible grounds, judges frequently select the “cheapest” basis. The cheapest option expends the least judicial time or effort. When one doctrine is increased in importance, the time and effort for the judge to consider the various summary judgment avenues change. In

77. *Id.* (“In almost every appellate case, the length of the briefs, the time for oral argument, and, most importantly, the attention spans of judges with overloaded dockets are all severely limited.”).

78. As litigation tactics, they are subject to “selection effects” in that displacement may affect which cases settle and do not result in a written opinion.

patent law, after judges construe claims, they can, for instance, evaluate summary judgment on either non-infringement or invalidity. Non-infringement is typically easier for the judge because there is often a single accused product to evaluate, in contrast with a more complicated analysis of multiple pieces of prior art under, for example, the obviousness doctrine. Furthermore, the judge may already be familiar with the accused product from the claim construction process.⁷⁹ Thus, judicial claim construction lowers the adjudicative cost of non-infringement relative to other defenses. For these reasons, non-infringement is commonly the preferred route to dispose of patent cases. Non-infringement and invalidity are not substitute doctrines. However, they are substitute methods of resolving cases. Moreover, even outside of the summary judgment context, judges may strategically choose which doctrine to use to dispose of the case. In situations in which the standard of review differs for the two doctrines, district court judges may rely upon the doctrine afforded more deference on appeal to reduce the risk of reversal.⁸⁰

Other academic literature supports the view that courts behave strategically in response to systemic changes to patent litigation. Professors Matthew Henry and John Turner studied the impact of the creation of the Federal Circuit on patent litigation.⁸¹ They conducted a time-series analysis of decisions from 1953 until 2002.⁸² According to Henry and Turner, the Federal Circuit, which was created in 1982, was substantially less likely to find a patent invalid than its predecessor courts.⁸³ If a district court judge found a patent invalid, the Federal Circuit was more likely to reverse than the regional circuit courts had been. Henry and Turner assert that, because the tendency

79. There is some case law stating that the accused product is legally irrelevant to claim construction. *See, e.g., SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1118 (Fed. Cir. 1985) (en banc) (stating that a claim is not to be construed in light of the accused device). Other cases expressly permit viewing the accused product to provide further context for the claim construction analysis. *See, e.g., Wilson Sporting Goods Co. v. Hillerich & Bradsby Co.*, 442 F.3d 1322, 1326 (Fed. Cir. 2006).

80. Max M. Schanzenbach & Emerson H. Tiller, *Strategic Judging Under the United States Sentencing Guidelines: Positive Political Theory and Evidence*, 23 J.L. ECON. & ORG. 24 (2007) (finding evidence that trial judges choose the bases for their sentencing decisions to protect their decision from higher court review); Joseph L. Smith & Emerson H. Tiller, *The Strategy of Judging: Evidence from Administrative Law*, 31 J. LEGAL STUD. 61 (2002) (finding support that strategic considerations influence trial courts when reviewing decision from the Environmental Protection Agency).

81. Matthew D. Henry & John L. Turner, *The Court of Appeals for the Federal Circuit's Impact on Patent Litigation*, 35 J. LEGAL STUD. 85, 85 (2006).

82. *Id.* at 88–89.

83. *Id.* at 90.

to reverse invalidity findings was well-known, district courts more frequently relied on non-infringement to resolve cases after 1982.⁸⁴

There is a third explanation for doctrinal displacement: the judge's role as a gatekeeper. In some instances, such as in claim construction after *Markman*, the judge must decide one doctrine before reaching others. These downstream doctrines can include doctrines relating to liability and damages. If the judge decides the first doctrine in a manner that resolves the dispute, the second doctrine need not be reached. For instance, assume that the decision-maker for the duty of reasonable care requirement in tort law was shifted from the jury to the judge. Thereafter, judges if they so desired could dispose of negligence actions without a jury trial on the basis that no duty was owed to the defendant. In this example, the doctrines of negligence and damages could be displaced due to the judge's gatekeeping role.

The gatekeeper theory permits extreme displacement of a doctrine. The displaced doctrine does not merely fall incrementally in the hierarchy of doctrines. A slight decrease would be consistent with the litigation constraints theory alone; rather, the gatekeeper theory adds that the doctrine drops substantially. A reallocation can drop another previously important doctrine below numerous other unaffected doctrines. And substitute doctrines that address the same equity concerns are strong candidates for displacement. When one doctrine becomes more prominent, the court can use it extensively. Substitute doctrines are not needed as much, and subsequently diminish in stature.

Doctrinal displacement may also be enhanced with the rise in summary judgment of another doctrine. If summary judgment is granted for the defendant on a particular defense, no jury trial may be necessary in the case. Doctrines which would have been evaluated by the jury become moot. Thus, increasing the grants of summary judgment has the effect of displacing doctrines typically considered by the jury downstream of the summary judgment decision.

The litigation constraints, judicial constraints, and gatekeeper explanations for doctrinal displacement are interrelated. When litigants know that the court acts as a gatekeeper before a doctrine is reached, they are more likely to downplay it. Instead, litigants focus their primary efforts on the gatekeeping doctrine. Similarly, when litigants understand that courts prefer to grant summary judgment on a particular basis, they are likely to file motions on that basis more often. Consequently, litigation realities amplify

84. *Id.* at 103.

the effect of the gatekeeper. As such, all three theories support the same result—the displacement of one doctrine as another gains importance.⁸⁵

2. *The Displaced Doctrine: The Doctrine of Equivalents*

The doctrine of equivalents permits a finding of infringement even if the accused device or method does not literally fall within the scope of the construed patent claims.⁸⁶ Instead, a device or method may infringe under the doctrine of equivalents if it performs “substantially the same function in substantially the same way to obtain the same result” as the patented invention.⁸⁷ Thus, the doctrine of equivalents permits an expansion of patent rights beyond the literal scope of the patent claims. One purpose of the doctrine of equivalents is to protect patentees from those who seek “to evade liability for infringement by making only insubstantial changes to a patented invention.”⁸⁸ The Supreme Court explained that without the doctrine of equivalents, a patent would be “a hollow and useless thing” and “unscrupulous copyist[s]” would be “encourage[d].”⁸⁹ At the onset of litigation, most patentees allege infringement both literally and under the doctrine of equivalents, with the latter being a fallback position.⁹⁰

The Federal Circuit endorsed the doctrine of equivalents in 1995, nearly simultaneously with the claim construction reallocation resulting from *Markman*. In *Hilton Davis Chemical Co. v. Warner-Jenkinson Co.*, the Federal Circuit, sitting en banc, affirmed a jury verdict of infringement under the doctrine of equivalents.⁹¹ In a 7–5 ruling, the majority held that an exception to the doctrine of equivalents known as prosecution history estoppel did not apply.⁹² The Federal Circuit also declined to reallocate the doctrine of equivalents to the judge, instead holding that the doctrine of equivalents was

85. An important question is whether displacement is intentional or an unintended consequence. This Article cannot answer that question with any certainty. However, the fact that no court has acknowledged displacement leads me to believe it is unintentional.

86. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 39–40 (1997).

87. *Graver Tank Mfg. Co. v. Linde Air Prods., Co.*, 339 U.S. 605, 608 (1950) (quoting *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929)). An accepted alternative test for the doctrine of equivalents is whether there are insubstantial differences between the accused device or method and the claimed invention. *Warner-Jenkinson*, 520 U.S. at 24. Another relevant consideration is the known interchangeability of the elements.

88. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 727 (2002).

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

90. Allison et al., *supra* note 2, at 977. (“Rather, a patentee is almost always arguing the doctrine of equivalents as an alternative to a theory of literal infringement.”).

91. *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1528–29 (Fed. Cir. 1995) (en banc), *rev’d*, 520 U.S. 17 (1997).

92. *Id.* at 1514.

a jury question.⁹³ In the years that followed, first the Supreme Court and then the Federal Circuit began limiting the reach of the doctrine of equivalents.

In the late 1990s and early 2000s, the Federal Circuit and Supreme Court issued several significant decisions involving the doctrine of equivalents.⁹⁴ These cases, in turn, placed legal limits—administered by judges—on when the doctrine of equivalents is applicable. First, in 1997, the Supreme Court decided *Warner-Jenkinson v. Hilton Davis*, which reversed the Federal Circuit's en banc decision.⁹⁵ In *Warner-Jenkinson*, the Supreme Court held that the All Element Rules must be employed,⁹⁶ meaning that each claim element must be present in the accused device or method either literally or equivalently.⁹⁷ Prior to this Supreme Court opinion, the Federal Circuit had not consistently and stringently applied the All Elements Rule, and sometimes it permitted patentees to loosely argue that the accused product was equivalent to the invention as a whole.⁹⁸

Thereafter, in 2000, the Federal Circuit en banc voted in *Festo v. Shoketsu Kinzoku Kogyo Kabushiki Co.* to bar the application of the doctrine of equivalents for certain claim elements.⁹⁹ The Federal Circuit found that the doctrine of equivalents was not available if a claim element had been amended during the process of examination by the Patent Office.¹⁰⁰

93. *Id.* at 1522 (“In answer to the second question posed by this court *en banc*, infringement under the doctrine of equivalents is an issue of fact to be submitted to the jury in a jury trial with proper instructions, and to be decided by the judge in a bench trial.”).

94. For a good discussion of the development of the doctrine of equivalents during this time frame, see Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 164–69 (2005); Michael Meurer & Craig A. Nard, *Invention, Refinement and Patent Claim Scope: A New Perspective on the Doctrine of Equivalents*, 93 GEO. L.J. 1947 (2005); Petherbridge, *Doctrine of Equivalents*, *supra* note 2, at 1385–1393.

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

96. *Id.* at 40 (“The determination of equivalence should be applied as an objective inquiry on an element-by-element basis.”).

97. *Id.* at 21 (“Nearly 50 years ago, this Court in [*Graver Tank*] . . . set out the modern contours of what is known in patent law as the ‘doctrine of equivalents.’ Under this doctrine, a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is ‘equivalence’ between the elements of the accused product or process and the claimed elements of the patented invention.”).

98. *Cf.* Joseph R. Re & Lynda J. Zadra-Symes, *Infringement Under the Doctrine of Equivalents: The Federal Circuit's First Ten Years*, 785 ALI-ABA PAT. L. & LITIG. 77, 93 (1992) (“The Federal Circuit has applied the element-by-element approach it adopted in banc in *Pennwalt* [in 1987] almost consistently since that decision.”).

99. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558 (Fed. Cir. 2000) (en banc), *vacated*, 535 U.S. 722 (2002).

100. *Id.* at 563 (“Therefore, an amendment that narrows the scope of a claim for any reason related to the statutory requirements for a patent will give rise to prosecution history estoppel with respect to the amended claim element.”).

Specifically, if the patentee had amended a particular element for “reasons relating to patentability”—such as to convince the Patent Office that the claim was new—then no equivalence was available for such element.¹⁰¹ After granting certiorari, the Supreme Court in 2002 rejected the Federal Circuit’s categorical test.¹⁰² Instead, the Supreme Court held that a rebuttable presumption applies to any claim amended for reasons relating to patentability.¹⁰³ However, the Supreme Court’s flexible and rebuttable presumption approach has been very difficult for patentees to overcome.¹⁰⁴ Thus, while the Supreme Court rejected the Federal Circuit’s rigid test, the effect of these rulings has been a substantial reduction in instances in which the doctrine of equivalents is applicable.¹⁰⁵

In sum, the doctrine of equivalents, a fairness doctrine juries apply, is arguably inconsistent with a patent system premised on predictability and on clear prior notice of the scope of rights.¹⁰⁶ In the years since *Markman*, there have been several Federal Circuit and Supreme Court cases touching on the doctrine of equivalents. These cases introduced substantive restrictions on

101. *Id.* at 569 (“When a claim amendment creates prosecution history estoppel with regard to a claim element, there is no range of equivalents available for the amended claim element. Application of the doctrine of equivalents to the claim element is completely barred (a ‘complete bar’).”).

102. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 723–25 (2002).

103. *Id.* at 741 (“When the patentee has chosen to narrow a claim, courts may presume the amended text was composed with awareness of this rule and that the territory surrendered is not an equivalent of the territory claimed. In those instances, however, the patentee still might rebut the presumption that estoppel bars a claim of equivalence. The patentee must show that at the time of the amendment one skilled in the art could not reasonably be expected to have drafted a claim that would have literally encompassed the alleged equivalent.”).

104. Christopher A. Harkins, *Choosing Between the Advice of Counsel Defense to Willful Patent Infringement or the Effective Assistance of Trial Counsel: A Bridge or the Troubled Waters?*, 5 NW. J. TECH. & INTELL. PROP. 210, 218 (2007) (“[W]hen a claim amendment is an amendment related to patentability, there arises a presumption of estoppel against the doctrine of equivalents, which presumption may only be overcome in a few ‘narrow ways.’”).

105. Daniel H. Shulman & Donald W. Rupert, *“Vitiating” the Doctrine of Equivalents: A New Patent Law Doctrine*, 12 FED. CIR. B.J. 457, 459 (2003) (“These other decisions, which have become more and more frequent in the last few years, limit the DOE by effectively creating a *per se* rule as to what constitutes an equivalent.”). In 2001, the Federal Circuit continued narrowing the reach of the doctrine of equivalents. The Federal Circuit en banc eliminated the doctrine of equivalents for a different type of claim element—no equivalents are available for subject matter disclosed in a patent specification but not literally claimed. *Johnson & Johnston Assocs. v. R.E. Serv. Co.*, 285 F.3d 1046 (2002) (en banc).

106. Timothy R. Holbrook, *Equivalency and Patent Law’s Possession Paradox*, 23 HARV. J.L. & TECH. 1, 5 (2010) (“The express purpose of [the doctrine of equivalents] is to ensure fair and adequate protection to the patentee and to solidify the patent incentive.”); cf. Meurer & Nard, *supra* note 94, at 1953–54.

the doctrine of equivalents.¹⁰⁷ However, the 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. For the most part, these cases reduced the occasions on which a patentee may successfully raise infringement under the doctrine of equivalents.¹⁰⁸ But the displacement had already occurred. While they surely further diminished the stature of the doctrine, they occurred subsequent to the doctrinal displacement.

Other scholars have empirically studied the success of patentees who attempt to rely upon the doctrine of equivalents, and their data supports the theory that the doctrine of equivalents has diminished in several respects. Petherbridge found that by 2007, patentees only rarely succeeded under the doctrine of equivalents.¹⁰⁹ Rather than tying the decrease in success to the *Markman* decision, Petherbridge traces it to the *Festo* decision in 2000, which provided strong limits on the availability of the doctrine of equivalents.¹¹⁰ Petherbridge also posited that the decline in the doctrine of equivalents is directly related to the rise in power of claim construction.¹¹¹ As the Federal Circuit increased its rate of modifying lower court claim constructions, it decreased the rate of success of a patentee on the doctrine of equivalents.¹¹² However, Petherbridge did not provide an explanation of why the increased importance of claim construction decreased the success rate on the doctrine of equivalents.¹¹³ Petherbridge, instead, argues that an intra-circuit dispute on

107. John R. Thomas, *Claim Re-construction: The Doctrine of Equivalents in the Post-Markman Era*, 9 LEWIS & CLARK L. REV. 153, 159 (2005).

108. See Fromer, *supra* note 24, at 735–38; Nicole S. Robbins, *The Curtailment of the Doctrine of Equivalents: Courts Emphasize the Public Notice Function of Patent Claims*, 35 SUFFOLK L. REV. 323, 339–43 (2001).

109. Petherbridge, *Doctrine of Equivalents*, *supra* note 2, at 1386–92. From reviewing the figures in Petherbridge's articles, it appears that the decline did not commence until at least *Markman I*.

110. *Id.* at 1390–92 (reporting that logistical regression predicts that changes in procedural circumstances in the doctrine of equivalents largely explain the decline).

111. Petherbridge, *Claim Construction Effect*, *supra* note 2, at 236.

112. *Id.* (“[R]egression analysis provides evidence that the Federal Circuit’s rejection of lower court claim construction determinations most strongly predicts a decrease in predictability, while other variables that could have explained it, like changes in the rules surrounding the doctrine of equivalents have either no impact or predict predictability rather than unpredictability.”).

113. In fact, Petherbridge argues that the procedural changes relating to claim construction did not cause the decline in the doctrine of equivalents. See Petherbridge, *Claim Construction Effect*, *supra* note 2, at 244 (“Procedural changes (e.g., increases in relative rates of incoming summary judgments potentially wrought by the *Markman/Cybor* framework) do not provide a strong explanation for the decline in doctrinal stability.”).

claim construction methodology appeared around 2000, which affected the doctrine of equivalents.¹¹⁴

Allison and Lemley draw somewhat different conclusions from their empirical study of outcomes of doctrine of equivalents cases.¹¹⁵ They studied district court and Federal Circuit doctrine of equivalents decisions in three periods surrounding the *Festo* decision.¹¹⁶ Allison and Lemley assert that the multiple substantive changes in the doctrine of equivalents law had “surprisingly little effect on the actual outcome of doctrine of equivalents cases.”¹¹⁷ More significant to the present Article, Allison and Lemley state that by the late 1990s, patentee assertions under the doctrine of equivalents almost never prevailed at trial or on appeal.¹¹⁸

Allison and Lemley argue that *Markman* killed the doctrine of equivalents.¹¹⁹ They speculate that after *Markman*, district court judges were inclined to err on the side of granting summary judgment of non-infringement under the doctrine of equivalents.¹²⁰ There was rarely a dispute about the structure or function of the accused product. So after the judge construed the claims, summary judgment of literal infringement or non-infringement was often appropriate.¹²¹ But granting summary judgment of no literal infringement would not resolve the entire lawsuit. To end the lawsuit, the court had to consider the patentee’s charge of infringement under the doctrine of equivalents.¹²² Allison and Lemley argue that judges “will be doubly inclined to hold for the accused infringer” on the doctrine of equivalents as the only way to dispose of the case.¹²³ Allison and Lemley’s explanation for the decline of the doctrine of equivalents is similar to the gatekeeper theory for displacement, and their empirical results are consistent with doctrinal displacement. However, their explanation is incomplete as they focus only on the trial court, not the appellate court, as a gatekeeper. They also do not fully articulate the litigation and judicial constraints aspects of displacement.

114. *Id.* at 245 (“The evidence to this point suggests that [the change in the realm of claim construction] more strongly involves changes in claim construction jurisprudence than it does changes in the rules of the doctrine of equivalents.”).

115. Allison & Lemley, *supra* note 2.

116. *Id.* at 963–66.

117. *Id.* at 957.

118. *See id.* at 970–71.

119. *See id.* at 977–78.

120. *See id.* at 977.

121. *Id.*

122. *Id.*

123. *Id.*

So why was the doctrine of equivalents displaced, and not some other doctrine? One explanation is that claim construction and the doctrine of equivalents serve similar functions—both are directed to the scope of protection for a patentee. Claim construction provides the literal reach of the patent. The doctrine of equivalents permits the patentee a further reach, as long as the differences between the literal claim scope and the accused product are insubstantial. When construing claims, the judge often knows the structure of the accused products. Using this knowledge, the judge may provide a broader construction to ambiguous claim language so as to avoid confronting the doctrine of equivalents. In other words, courts may have found these doctrines to be substitutes for each other. And as previously noted, substitute doctrines are strong candidates for displacement.¹²⁴

A related explanation is that claim construction has arguably expanded to encompass the doctrine of equivalents. The doctrine of equivalents permits the patentee to cover items that perform substantially the same function although they have different structure. For instance, a stent with an oval cross-section might be found equivalent to a claimed one with a “circular” cross-section. After *Markman I*, claim construction is performed solely by judges. Juries did not need to provide a written record of their claim construction. Judges, when forced to do this, regularly defined the claim terms—structural terms—using functional definitions.¹²⁵ Post *Markman I*, the judicial craft of claim construction has subsumed the doctrine of equivalents. Consequently, the need for the doctrine of equivalents was effectively eliminated.

As outlined above, Allison and Lemley provide a different reason for the displacement of the doctrine of equivalents. After the judge steeped herself in the technology and construed the claims, she was less inclined to submit the case to a jury.¹²⁶ However, to fully resolve the case, the doctrine of equivalents needed to be decided.¹²⁷ Thus, as a practical matter, judges quickly decided the doctrine of equivalents under the guise of summary judgment to keep the case from the jury.¹²⁸ If this is true, one would expect less success on the doctrine of equivalents after *Markman* hearings became important.¹²⁹ While *Markman* mandated that district court judges construe the

124. See *supra* Section II.B.1.

125. An exception to this is organic chemistry, a field in which structure can be defined by structure alone.

126. See Allison & Lemley, *supra* note 2, at 977.

127. *Id.*

128. See *id.*

129. *Id.* at 977–98.

patent claims, it left open when and how judges do so. Some courts adopted local patent rules that specified the timing of claim construction.¹³⁰ Many judges elected to hold separate hearings, often called *Markman* hearings.¹³¹ These hearings solely focused on the meaning of the claims, and they are typically divorced from consideration of the issues of infringement, validity, or enforceability.¹³² *Markman* hearings could last up to several weeks and sometimes included live witness testimony. Other judges elected to construe the patent claims simultaneously with deciding dispositive motions. These judges often did not hold a *Markman* hearing but, instead, decided the issue of claim construction based on the written record developed during summary judgment briefing. The Federal Circuit has taken no position on the timing and procedure used by district courts to construe claims, and it has approved of both major approaches.¹³³ The sole Federal Circuit mandate was that claim construction must be performed by the court, not the jury.¹³⁴ 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. Because the substantive changes to the doctrine of equivalents in *Festo* are so close in time to the rise of separate hearings, it would be difficult to directly test whether the hearings are correlated with the displacement.

III. STUDY DESIGN AND METHODOLOGY

The findings of this Article are based upon data derived from three databases: (1) a claim construction appellate decision database consisting of information from all published and unpublished claim construction decisions from 1991 until 2008; (2) an appellate issue database consisting of information for all electronically available Federal Circuit decisions from the

130. See, e.g., N.D. CAL., P.R. 4-5, 4-6 (2010); E.D. TEX., P.R. 4-5, 4-6 (2010); N.D. GA., P.R. 6.5, 6.6 (2009); W.D. PA., P.R. 4 (2009); S.D. TEX., P.R. 4.5, 4.6 (2008); E.D. N.C., P.R. 304.5, 304.6 (2010).

131. William F. Lee & Anita K. Krug, *Still Adjusting to Markman: A Prescription for the Timing of Claim Construction Hearings*, 13 HARV. J.L. & TECH. 55, 59 (1999).

132. See Sease, *supra* note 40, at 99.

133. The Federal Circuit has even authorized the court to conduct rolling claim construction, revising an initial claim construction after the record was more fully developed. See, e.g., *SanDisk Corp. v. Memorex Prods., Inc.*, 415 F.3d 1278, 1291 (Fed. Cir. 2005) (“After discovery the court expects the parties to refine the disputed issues and learn more about the claim terms and technology, at which point a more accurate claim construction can be attempted.”).

134. Lee & Krug, *supra* note 131, at 56–57 (noting that *Markman* did not proscribe any particular timing to claim construction, and further noting that district courts have construed patent claims as early as the onset of litigation and as late as prior to jury instruction).

years 1991, 1994, 1997, and 2000; and (3) a word count appellate database consisting of published appeals following grants of summary judgment from 1987 until 2004. The appellate issue and word count appellate databases were created for this Article. This Part describes the databases and the process for constructing them. It then discusses limitations of the study including limitations of empirical legal studies of appellate court decisions more generally.

A. THE DATABASES

1. *The Claim Construction Appellate Decision Database*

The claim construction appellate decision database includes all claim construction appellate decisions from district court litigation¹³⁵ from January 1, 1991 until December 31, 2008.¹³⁶ Overall, the database contains 1,288 Federal Circuit decisions, including 157 decisions before *Markman I.*¹³⁷ Appeals are included regardless of the procedural posture—whether resolved via preliminary injunction, summary judgment, trial, or otherwise. The database only includes appeals from district courts. Accordingly, it does not include appeals from the United States Patent & Trademark Office, the Court of Federal Claims, or the International Trade Commission.

The claim construction appellate decision database includes all merits resolutions by the Federal Circuit of claim construction appeals from district court litigation. The Federal Circuit can resolve appeals involving claim construction through several mechanisms including a precedential written opinion, a non-precedential written opinion, and a summary affirmance. The database includes precedential and non-precedential opinions, as well as appeals resolved without a written opinion. A detailed explanation of how

135. The dataset only includes utility patents. Appellate review of claim construction of design patents (and plant patents) is relatively infrequent. Because claim construction of design patents is substantively different from claim construction of utility patents, design (and plant) patents were excluded from the present study.

136. The claim construction appellate decision database has been used in several previous studies. See David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 237–41 (2008) [hereinafter Schwartz, *Practice Makes Perfect*]; David L. Schwartz, *Courting Specialization: An Empirical Study of Claim Construction Comparing Patent Litigation Before Federal District Courts and the International Trade Commission*, 50 WM. & MARY L. REV. 1699 (2009); David L. Schwartz, *Pre-Markman Reversal Rates*, 43 LOY. L.A. L. REV. 1073 (2010) [hereinafter Schwartz, *Pre-Markman Reversal Rates*].

137. The reliability and validity of the original database is high. See Schwartz, *Practice Makes Perfect*, *supra* note 136, at 272–73.

the original dataset was derived is available elsewhere¹³⁸ and consequently, not repeated here.

2. *The Appellate Issue Database*

The appellate issue database identifies the issues discussed in Federal Circuit decisions from the years 1991, 1994, 1997, and 2000. The years were selected to include equally spaced samples, before and after *Markman I* and *II*.

The database records specific issues explored in all electronically-available Federal Circuit opinions, both precedential and non-precedential, during those years. The issues are generally identified by headings in the opinions such as anticipation, obviousness, inequitable conduct, and infringement. Most cases involved multiple issues. Claim construction may be analyzed as a precursor to any of these issues. Even if the Federal Circuit's analysis did not use a heading, if the opinion discussed the issue, it was included in the database. For claim construction and the doctrine of equivalents, an opinion was not recorded unless there was a specific discussion in the opinion analyzing the relevant law or facts.¹³⁹ A bare bones recitation in an opinion, such as one which notes that infringement was not shown literally or under the doctrine of equivalents or that the court must construe the claims, was not recorded.¹⁴⁰

To develop the appellate issue database, a Lexis query was performed to locate potentially relevant cases.¹⁴¹ A human coder recorded the issues

138. For a thorough discussion of the selection, coding, and reliability of the dataset, see Schwartz, *Practice Makes Perfect*, *supra* note 136, at 269–74. For a discussion of particular issues with locating earlier (pre-1995) cases, see Schwartz, *Pre-Markman Reversal Rates*, *supra* note 136, at 1073, 1091–92.

139. Technically, claim construction is a doctrine, not an issue. See Tiller & Cross, *supra* note 18 (discussing the distinction between doctrine and issue.) As for the doctrine of equivalents, the Supreme Court itself uses the phrase “*doctrine of equivalents*.” In coding the appellate issue database, claim construction and the doctrine of equivalents were included, in addition to the general issues of §§ 101, 102, 103, and 112; literal infringement; and inequitable conduct.

140. The Federal Circuit in some cases noted that an issue was briefed but would not be decided. See, e.g., *Purdue Pharma, L.P. v. Faulding, Inc.*, 230 F.3d 1320, 1329–30 (Fed. Cir. 2000) (“Because we have upheld the district court’s determination that the asserted claims of the ’360 patent are invalid, it is unnecessary to address Faulding’s cross-appeal from the district court’s finding of infringement.”). These undecided issues were excluded from the database.

141. In the CAFC database, the following query was executed: “court and date(geq (1/1/1991) and leq (12/31/1991)) and not name(trademark or department or secretary or “international trade” or “merit systems” or veteran or “federal claims” or “in re”) and not(“patent appeals and interferences” or “united states claims court”).” Because summary affirmances did not discuss any issues, they were not responsive to the Lexis search.

discussed by the Federal Circuit in every case. Opinions from merits decisions of district courts were included, regardless of whether the district court resolved the case via preliminary injunction, summary judgment, bench trial, or jury trial.¹⁴² The appellate issue database includes 297 total opinions, including 54 opinions from 1991; 55 from 1994; 90 from 1997; and 98 from 2000.

3. *The Word Count Appellate Database*

The word count appellate database includes specific word count information about certain appellate decisions from 1987 until 2004.¹⁴³ The database notes the number of words in each opinion devoted to claim construction and the number of words devoted to the doctrine of equivalents. Words devoted to the doctrine of equivalents includes discussion about any test or argument relating to the doctrine of equivalents including prosecution history estoppel limitation. The database also records the total word count discussing all issues on appeal, typically organized in the opinion under the heading "Discussion." Most opinions in the database have separate headings under which the patent and claims were introduced. Consequently, the claim construction word count typically does not include a recitation of the claim as a whole.

To attempt to keep as much as possible constant across the 1987 until 2004 time period, only appeals reviewing a grant of summary judgment are included. No appeals from jury or bench trials are included.¹⁴⁴ Thus, the word count appellate database excludes decisions in which the jury construed the claims or the jury decided the doctrine of equivalents. If all opinions were included, including those reviewing jury verdicts, we may expect a change in word count due to the doctrinal reallocation of claim construction alone. This is because there would be a larger appellate record after the judge construed the claims. In other words, after *Markman*, the record in a jury case would include a judicial claim construction. In contrast, the record from jury trials before *Markman* frequently did not, as the judge did not expressly

142. Only appeals from utility patent litigation at the district court were included. Non-merit appeals, such as from motions to dismiss for lack of personal jurisdiction, were omitted. Cases in which liability and attorney fees generated separate appeals were only included in the dataset for the liability appeal.

143. The beginning year of 1987 was selected because jury demands in patent cases were less frequent before the late 1980s. *See Moore, supra* note 44, at 851 fig.1.

144. In some cases, summary judgment is granted in part, such as for literal infringement, and denied in part. In these cases, a trial is conducted on the doctrine of equivalents. This sort of case was excluded. Only cases in which claim construction and the doctrine of equivalents was resolved on summary judgment were included.

construe the claims. Because there is more to review, we may expect more words in the appellate opinions. There is not a similar problem in summary judgment appeals. In summary judgment cases before and after *Markman*, the judge construed the claims. By using summary judgment cases only, this concern is substantially alleviated. However, the study assumes that the district courts would grant summary judgment in the same cases before and after *Markman*.

The database is limited to precedential opinions because non-precedential opinions typically are not as well organized. They often lack the organization present in precedential opinions, such as a separate “Discussion” section. This presents potential coding difficulties. Furthermore, the non-precedential opinions often are very cursory, especially relative to precedential opinions. Because the opinions are short, the use or omission of introductory sentences to either the claim construction or doctrine of equivalents discussion could materially alter the results. For this reason, a word count of non-precedential opinions was not deemed to be as useful.

To develop the word count appellate database, an overbroad query was performed on Lexis to locate potentially relevant cases.¹⁴⁵ Thereafter, a human coder read every case¹⁴⁶ to confirm that all of the following were true: (1) the appeal was from a decision of a federal district court; (2) the federal district court resolved the lawsuit on summary judgment; and (3) the appeal addressed either claim construction or the doctrine of equivalents, or both. The coder noted the number of words devoted to each issue, the number of words in the “Discussion” section which typically included a discussion of all issues on appeal, as well as the number of words in the entire opinion. The “Discussion” section did not include background information about the patent, technology, or procedural posture of the case. The recitation of the claim itself was not counted as part of the claim construction analysis. Words in an alternative opinion, such as concurring or dissenting opinions, were not counted. The word count appellate database includes word count information from 183 opinions.

145. In the CAFC database, the following query was executed: “claim w/10 (constru! or interp!) and (doctrine w/5 equivalents) and “summary judgment” and date(geq (1/1/1987) and leq (12/31/2004)).”

146. Several significant en banc decisions were omitted to avoid skewing the sample. These included *Markman*, *Warner-Jenkinson*, *Cybor*, *Festo*, and *Johnson & Johnston*. The appeal in each of these cases only involved one of the doctrines, and the word count of the discussion in each was substantial.

B. LIMITATIONS OF THE DATABASES AND EMPIRICAL STUDIES OF APPELLATE DECISIONS

All projects involving empirical studies of legal decisions have limitations and the present study is no exception. First, patent litigation is extremely complex. Typically, there are numerous issues raised by the parties. These issues are often fact-specific for each case. 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. Not only is the underlying technology different in these scenarios, but the parties' strategic goals vary as well. Consequently, it is difficult to make generalizations about patent litigation from the study of individual cases.

Second, the present Article uses data gathered through content analysis of judicial opinions, which has well-known limitations.¹⁴⁷ These include unobserved reasoning, strategic behavior, and selection bias.¹⁴⁸ Judge Harry Edwards argues that empirical methods are not useful to understanding judicial decision-making.¹⁴⁹ He argues that statistics cannot distinguish among extralegal factors that affect judicial decision-making.¹⁵⁰ These unobserved factors include the state of the case record on appeal and the judicial deliberations that preceded the opinion.¹⁵¹ He also argues that most empirical legal studies of case law lack firm support because they exclude summary affirmances. In the present study, the claim construction appellate decision database includes summary affirmances; however, the word count appellate database and appellate issue database do not. By definition, there are no words to count in a summary affirmance. For the appellate issue database and the related analysis, the study assumes that the issues raised in summary affirmances and opinions are the same, an assumption which may not be correct.

147. Mark A. Hall & Ronald F. Wright, *Systematic Content Analysis of Judicial Opinions*, 96 CALIF. L. REV. 63, 105–06 (2008) (discussing the limitations of content analysis as part of their call for greater use of content analysis).

148. For a discussion of these limitations, 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).

149. Harry T. Edwards & Michael A. Livermore, *Pitfalls of Empirical Studies That Attempt To Understand the Factors Affecting Appellate Decisionmaking*, 58 DUKE L.J. 1895 (2009).

150. *Id.* at 1899 (“Legal scholars remain interested in trying to use empirical methods—most notably the statistical analysis of case outcomes—to understand the effect of extralegal factors on appellate decisionmaking. In our view, the principal problem with such empirical legal analyses is that they cannot distinguish between legal and extralegal factors without considering and accurately accounting for the most important determinants of appellate decisionmaking: (1) the case records on appeal, (2) the applicable law, (3) controlling precedent, and (4) judicial deliberations.”).

151. *Id.*

Separately, patent law changed in many ways in the last twenty years. The Supreme Court and Federal Circuit issued numerous substantive decisions that altered the law, only some of which are described by this Article. Changes to one doctrine may cause substantive effects on the law in other doctrines. Furthermore, Congress also amended the Patent Act several times during the time period of this study. These changes include adjusting how to calculate the patent term¹⁵² and requiring publication of most patent applications before issuance.¹⁵³

Each of these changes may affect patent litigant strategies and substantive patent law doctrines. Because patent litigation as a whole is so complex, it is incredibly complicated to develop and test empirical models. This complexity is especially prevalent when multiple doctrines in patent law are interrelated and studied simultaneously. Changes in precedent can alter lawyers' behavior in drafting patents. Furthermore, changes in precedent can also influence party behavior in litigation. Thus, the patent litigation system is dynamic and, over time, the types of lawsuits brought will change.

Another limitation is that the changes studied involving claim construction and the doctrine of equivalents are endogenous to the Federal Circuit. In other words, while this Article termed *Markman* and *Cybor* as the cause of doctrinal reallocation and displacement, the court itself made these changes. As the Federal Circuit made the *Markman I* and *Cybor* decisions, as well as the subsequent opinions studied in this Article, the events are not truly independent. No empirical methodology can correct for this. Furthermore, this Article does not differentiate among the various judges on the Federal Circuit; rather, the Federal Circuit is treated as a single static court. While the data are largely consistent with the propounded hypotheses, this Article makes no claims regarding causation. To the extent it makes any assertions, it is limited to mere correlation. The explanations for the correlations deserve further empirical and theoretical scrutiny.

Another limitation stems from general changes in litigation over the studied time period. Even outside of patent lawsuits, litigation in general has increased since the early 1990s. For example, there were approximately 265,000 lawsuits filed in federal court in fiscal year 1992.¹⁵⁴ In contrast, in fiscal year 2008, there were approximately 350,000 lawsuits, an increase of

152. Uruguay Round Agreements Act, Pub. L. No. 103-465, sec. 532(a), § 154, 108 Stat. 4809, 4983-85 (1994).

153. Act of Nov. 29, 1999, Pub. L. No. 106-113, § 1000(a)(9), 113 Stat. 1501, 1536 (1999) (enacting into law the American Inventors Protection Act of 1999, S. 1948, 106th Cong., tit. IV, sec. 4502, § 122 (1999) (codified at 35 U.S.C. § 122 (2006))).

154. *U.S. District Court—Judicial Caseload Profile*, UNITED STATES COURTS (Apr. 1998), <http://www.uscourts.gov/cgi-bin/cms.pl> (accessed by choosing “ALL DISTRICT COURTS” from the dropdown menu and pressing the “Generate” button).

about twenty-five percent.¹⁵⁵ Total federal case appeals also slightly increased in a generally linear fashion between the early 1990s and 2008.¹⁵⁶ The rate of summary judgment in all litigation also may have changed over time.¹⁵⁷

In addition to the changing nature of patent and civil litigation over time, any study of appellate decisions has certain inherent limitations. These limitations include most notably a potential selection bias.¹⁵⁸ Because previous articles described in detail the potential selection effect, it will be only briefly discussed here.¹⁵⁹ First, appellate decisions are not a random sample of all patent disputes or all patent infringement complaints. Obviously, in real-world patent litigation, in each case the merits, the parties, and the parties' resources differ.¹⁶⁰ Each of these factors affects which disputes become lawsuits, which lawsuits proceed through final, appealable judgment, and which decisions are appealed. The closer cases, such as those fifty-fifty cases wherein either party could prevail (including cases with closer claim construction arguments), may be appealed at a higher frequency.¹⁶¹ However, the present study does not rely upon case outcomes, which evaluate the performance of the district court and are susceptible to distortion based on selection effects.¹⁶² Instead, because this Article examines

155. *U.S. District Court—Judicial Caseload Profile*, UNITED STATES COURTS (2008), <http://www.uscourts.gov/cgi-bin/cmsd2008.pl> (accessed by choosing “ALL DISTRICT COURTS” from the dropdown menu and pressing the “Generate” button).

156. *Federal Court Management Statistics*, UNITED STATES COURTS (2010), <http://www.uscourts.gov/fcmstat/index.html>.

157. Paul W. Mollica, *Federal Summary Judgment at High Tide*, 84 MARQ. L. REV. 141, 141 (2000) (noting the declining percentage of civil cases proceeding to trial in federal courts over time, and tying that to “the emergence of summary judgment as the new fulcrum of federal civil dispute resolution”).

158. See Schwartz, *Pre-Markman Reversal Rates*, *supra* note 136, at 1101–06.

159. E.g., Richard S. Gruner, *How High Is Too High?: Reflections on the Sources and Meaning of Claim Construction Reversal Rates at the Federal Circuit*, 43 LOY. L.A. L. REV. 981, 1003–24 (2010); Schwartz, *Pre-Markman Reversal Rates*, *supra* note 136, at 1101–06; Ted Sichelman, *The Myths of (Un)Certainty at the Federal Circuit*, 43 LOY. L.A. L. REV. 1161, 1179–83 (2010).

160. See John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 202–05, 250–51 (1998).

161. Kimberly A. Moore, *Are District Court Judges Equipped To Resolve Patent Cases?*, 15 HARV. J.L. & TECH. 1, 9–10 (2001); George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL. STUD. 1, 4, 16 (1984). Other empirical studies have reported plaintiff win rates in patent jury trials at nearly seventy percent, contrary to what one would expect using the limiting case of the Priest/Klein economic theory. Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 385–86 (2000); see also Alan C. Marco, *The Selection Effects (and Lack Thereof) in Patent Litigation: Evidence from Trials*, 4 TOPICS ECON. ANALYSIS & POL'Y, iss. 1, art. 21 (2004), <http://www.bepress.com/bejeap/topics/vol4/iss1/art21/> (reporting that there does not appear to be a selection bias tending to produce a fifty percent patent infringement win rate, but that there does appear to be a selection bias toward fifty percent in the validity win rate).

162. Wagner & Petherbridge, *supra* note 148, at 1127–29.

appellate choices such as whether to publish an opinion or designate it as precedential, and other metrics of solely appellate court decision-making, the potential selection effects problem is slightly muted.

Studying the time period surrounding a major change such as *Markman* also presents difficulties. For example, the cases that survived until an appellate decision may have changed across this period. When juries performed claim construction, more accused infringers may have settled instead of risking a jury ruling.¹⁶³ After *Markman*, accused infringers in similar cases could more freely litigate claim construction before a judge. As more courts utilized a completely separate claim construction hearing, the number of litigants willing to proceed through claim construction may have increased. For these reasons, the types of cases that resulted in a Federal Circuit decision may be different before and after *Markman*.

The word count appellate database has a separate concern because it has a smaller sized dataset. It currently analyzes word count information from less than two hundred Federal Circuit opinions over a fifteen-year period. On average, there were about ten opinions per year,¹⁶⁴ with more opinions in recent years and fewer in earlier years. The small number of observations affects the statistical tests performed. Furthermore, word counts in appellate decisions only illustrate behavior at the Federal Circuit level. The database does not directly report doctrines or word counts raised in the trial court. Moreover, because it is limited to cases in which the court granted summary judgment, it consists almost entirely of cases wherein the accused infringer prevailed at the district court. For each of the foregoing reasons, all results and discussion of the data are subject to the limitations discussed in this Section.

IV. DATA ON THE DEMISE OF THE DOCTRINE OF EQUIVALENTS

Using the theories provided in Part II, this Part provides hypotheses on the ramifications of these phenomena including hypotheses about the doctrine of equivalents. Part IV also sets forth the results of empirical testing of the hypotheses. Section IV.A provides the doctrinal reallocation hypotheses and results. Section IV.B examines the doctrinal displacement hypotheses and results.

163. Schwartz, *Pre-Markman Reversal Rates*, *supra* note 136, at 1099.

164. There are more than ten claim construction opinions per year. However, the word count appellate database was created using only cases in which both claim construction and the doctrine of equivalents were discussed.

A. REALLOCATION HYPOTHESES AND RESULTS

This Section examines hypotheses and data that suggest that the horizontal and vertical reallocations in *Markman* and *Cybor* made claim construction more central and important in patent litigation. According to the theory proposed in Part II, *supra*, the horizontal and vertical reallocations illustrated in Figure 3 provided more control of claim construction to the appellate court. The control gave the Federal Circuit the ability to emphasize or deemphasize claim construction in the overall context of patent litigation. When confronted with the opportunity, the Federal Circuit elected to make claim construction more rather than less important. At first glance, this statement seems obvious—claim construction is perhaps the central doctrine in patent litigation today. Practitioners and professors who came of age after *Markman* may believe that claim construction was always central to patent litigation. However, before *Markman*, it is debatable whether claim construction was as important.¹⁶⁵ This hypothesis tests the conventional wisdom that claim construction was always important.¹⁶⁶

The hypotheses derive from the time period around *Markman* and *Cybor*. The Federal Circuit exerted control over lower courts¹⁶⁷ and over claim construction as a result of *Markman*.¹⁶⁸ This Article argues that the Federal Circuit enhanced the importance of claim construction to increase the predictability of patent litigation. This explanation is consistent with the remarks of Judge Plager,¹⁶⁹ and with the statements in the *Markman* opinion itself.¹⁷⁰ Generally, a court using its control to increase the importance of a

165. See Craig Allen Nard, *Process Considerations in the Age of Markman and Mantras*, 2001 U. ILL. L. REV. 355, 360 (“It was not until the 1995 en banc Federal Circuit decision in *Markman* . . . that [the notice function of patents] reached the forefront of patent law jurisprudence.”).

166. See, e.g., Edward M. O’Toole, *How To Prepare for and Conduct Markman Hearings 2006*, in HOW TO PREPARE & CONDUCT MARKMAN HEARINGS 2006, at 175, 207 (PLI Patents, Copyrights, Trademarks, & Literary Prop., Course Handbook Series No. 873, 2006) (“After all, claim construction has always been an important aspect of resolution of patent disputes, and most patent cases continue, as they always have, to turn on claim construction—impacting the issue of infringement or validity, or both.”).

167. Legal doctrine is taught by higher courts to lower courts. See Tonja Jacobi & Emerson H. Tiller, *Legal Doctrine and Political Control*, 23 J.L. ECON. & ORG. 326 (2007).

168. John F. Duffy, *On Improving the Legal Process of Claim Interpretation: Administrative Alternatives*, 2 WASH. U. J.L. & POL’Y 109, 123 (2000) (“Together *Markman* and *Cybor* have . . . centralized judicial power to interpret claims in the Federal Circuit.”).

169. See Plager, *supra* note 50.

170. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 989 (Fed. Cir. 1995) (en banc) (Mayer, J., concurring) (noting that the majority opinion attempts “to free patent litigation from the ‘unpredictability’ of jury verdicts”), *aff’d*, 517 U.S. 370 (1996).

doctrine will perform certain observable tasks. Empirically testing whether these tasks occurred in patent law permits evaluation of the theory.

The Article sets forth *infra* three hypotheses relating to doctrinal reallocation. The first hypothesis is that, after *Markman*, the Federal Circuit issued a greater percentage of written claim construction opinions. The second is that, after *Markman*, the Federal Circuit issued a greater percentage of precedential claim construction opinions. The third is that, after *Markman*, a greater percentage of claim construction appeals arose from summary judgment. Each of these hypotheses, both separately and together, is consistent with the view that the Federal Circuit made claim construction more important after *Markman*.

1. *Reallocation Hypothesis #1: After Markman I, the Federal Circuit issued a greater percentage of written opinions*

The first hypothesis contends that the Federal Circuit issued a greater percentage of written opinions on claim construction after *Markman*. More written opinions signal that the Federal Circuit believes that claim construction is important. Obviously, the appellate court can only issue opinions on a particular doctrine that the parties raise on appeal. This caps the maximum number of opinions an appellate court can generate.

However, the federal courts of appeal need not produce a written opinion in every case. They have the option of affirming without providing a written opinion, a procedure known as summary affirmance.¹⁷¹ When using a summary affirmance, the appellate court disposes of the case without explaining its reasoning.¹⁷² Alternatively, the court may issue a written opinion that sets forth the complete basis for its opinion.¹⁷³ The court chooses which cases to decide by written opinions and which to decide by summary affirmance.¹⁷⁴ Issuing more written opinions cues litigants of the increased importance of the doctrine. A greater percentage of claim construction appeals were (and will continue to be) resolved by written opinions after *Markman*.

171. See FED. CIR. R. 36.

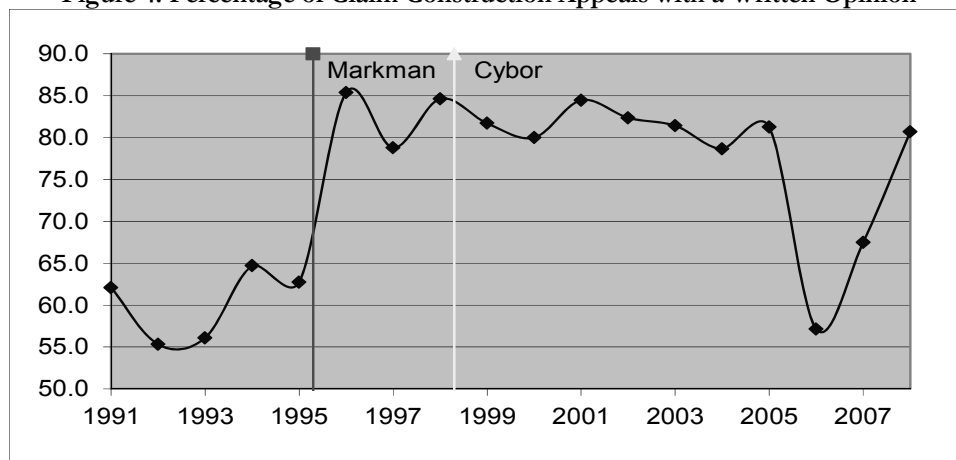
172. Pamela S. Karlan, Comment, *Electing Judges, Judging Elections, and the Lessons of Caperton*, 123 HARV. L. REV. 80, 83 (2009); see, e.g., *Sutton v. Nokia Corp.*, No. 2010-1218, 2010 WL 5230901 (Fed. Cir. 2010) (affirming decision of lower tribunal without providing any explanation).

173. FRANK M. COFFIN, ON APPEAL: COURTS, LAWYERING, & JUDGING 165 (1st ed. 1994).

174. *Taylor v. McKeithen*, 407 U.S. 191, 194 n.4 (1972) (“We, of course, agree that the courts of appeals should have wide latitude in their decisions of whether or how to write opinions. That is especially true with respect to summary affirmances.”).

Moving now to the empirical results, Figure 4, *infra*, shows the annual percentage of claim construction appeals that garnered a written opinion.

Figure 4: Percentage of Claim Construction Appeals with a Written Opinion



The ordinate illustrates the percentage of decisions that received a written opinion plotted against the year of the Federal Circuit disposition. All of the opinions in a given year are collapsed into a single data point.¹⁷⁵ For clarity, Figure 4 notes the dates of the *Markman I* and *Cybor* decisions.

Almost simultaneously with *Markman I* in 1995, the Federal Circuit decreased the rate of summary affirmances and began issuing more written opinions on claim construction. To provide a more comprehensive analysis, a multiple-regression model of the data was developed. According to the model, even when other potentially explanatory variables are controlled for, the odds of a written opinion after *Markman I* are more than twice as high as

175. There have been 1288 opinions over eighteen years, and there are approximately seventy-two opinions per year. Regression assumes that each variable is independent and identically distributed, but this assumption may not hold in a precedential system in which a prior decision influences subsequent decisions. See James Greiner, *Judicial Decisions as Data Points*, SOCIAL SCIENCE STATISTICS BLOG (March 20, 2007, 16:40 EST), <http://www.iq.harvard.edu/blog/sss/archives/2007/03/> (arguing that certain empirical assumptions should be cautiously considered in a precedential system). After a court decides a significant precedential case which clarifies or alters the substantive doctrine, one might expect a subsequent decrease in written and precedential opinions. Here, the trend illustrated in Figures 4 and 5 shows increased precedential and written opinions after *Markman*, which is in the opposite direction of this prediction. In fact, the role of precedent may if anything be downwardly tampering the effects. However, the effects of precedent are very complicated, and an alternative hypothesis is that new case law invites uncertainty and more precedential written opinions. Further research is needed into the general question of the relationship between legal precedent and the assumptions in empirical models.

before *Markman I*, and the difference is statistically significant.¹⁷⁶ As illustrated in Figure 4, the Federal Circuit resolved only about sixty percent of all claim construction appeals from 1991 until 1995 with a written opinion. Thus, it was quite likely that a claim construction appeal resulted in no case law (either precedential or non-precedential), and no guidance to litigants.¹⁷⁷ After 1995 (the year *Markman I* was decided), however, the rate of written opinions quickly increased to between eighty and eighty-five percent.¹⁷⁸

It should be noted that there is a downward spike in Figure 4 that begins in September 2006 and ends in very early 2007. The reason for that spike presently cannot be completely explained. The time period of the spike begins in September, which is roughly contemporaneous with the turnover of law clerks. Perhaps for that year only, some judges amassed a backlog of cases with their old clerks and used summary affirmances to pare their dockets. An alternative explanation relates to district court decisions appealed shortly before the en banc *Phillips v. AWH* decision but decided by the Federal Circuit around the time of the spike.¹⁷⁹ Perhaps these were appeals in which the district court correctly construed the claims but used the wrong rationale, such as placing a heavy reliance on dictionaries. The Federal Circuit judges may have agreed that the result was correct and utilized summary

176. The detailed regression results can be found in Tables 4a and 4b in the Appendix. The control variables for the main regression of Tables 4a are the geographic location of the district court (i.e., which Circuit the district court resided in); whether the district court was in one of the ten busiest patent districts during the given year; the technology of the underlying patent (chemical, mechanical, or electrical), the posture of the district court judgment (preliminary injunction, summary judgment, jury trial, or bench trial), and winner at the district court (patentee or accused infringer). The odds ratio is 2.86 with a p-value of 0.000. A p-value of 0.05 or less signifies that the null hypothesis—in this case that there is no difference in the use of summary affirmance/Rule 36 before and after *Markman*—can be rejected with a 95% confidence level. Here, the p-value is 0.000, which means that the null-hypothesis can be rejected. The odds ratio means it was 186% more likely at the mean for a summary affirmance/Rule 36 claim construction decision before *Markman I*, after controlling for the aforementioned variables. A separate regression shown in Table 4b includes the total number of patent opinions and Rule 36 cases on any issue, not just claim construction. The results of the separate regression show that even controlling for Federal Circuit patent opinions and Rule 36 decisions outside of claim construction, it was 96% more likely at the mean for a Rule 36 claim construction decision before *Markman I* than after (p-value=0.000). For a discussion of regression analysis, see *supra* note 175.

177. The author takes no position on the optimal or minimum amount of case law to develop a doctrine. Rather, it is only noted that after *Markman I*, the court employed Rule 36 less frequently than before.

178. It is also worth noting that there were no substantial increases in the number of active Federal Circuit judges during this time period.

179. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) (resolving an intra-circuit split on whether dictionary definitions should be the default claim construction of a disputed term).

affirmances in these instances. Finally, it is possible that it is an unintentional clustering of results in the data.¹⁸⁰ In any event, this data was included within the regression and the results remain statistically significant.

After *Markman*, the Federal Circuit vastly increased the number of written opinions describing claim construction methodology and analysis.¹⁸¹ Not only did it receive more appeals involving claim construction after *Markman*,¹⁸² but it drafted written opinions for a greater percentage of those appeals.¹⁸³ The larger volume of opinions signals to litigants the increased importance of the doctrine. When more cases address a particular issue, litigants understand that the court is interested in the issue. Because summary affirmances do not include any written opinions, the public (other than the particular litigants involved in the case) cannot easily know what issues were raised in those cases. The focus on claim construction in opinions encouraged litigants to raise this issue on appeal. This further increased the significance of the doctrine of claim construction.

2. *Reallocation Hypothesis #2: After Markman I, the Federal Circuit issued a greater percentage of precedential opinions*

The second hypothesis is that the Federal Circuit issued a greater percentage of precedential opinions on claim construction after *Markman*. In addition to resolving cases without any opinion (by summary affirmance), the courts can also issue different types of written opinions. For every written opinion, the courts of appeals may designate the opinion as either precedential or non-precedential.¹⁸⁴ Precedential opinions have various functions—announcing new law, applying settled law to new facts, and

180. A Federal Circuit judge on the bench during this time period told the author that he believes it is random.

181. Some may argue that a court issues a written opinion instead of a summary affirmance when the dispute is complicated. However, there is no reason to believe that the complexity of disputes changed in 1995. So this does not explain the change in the frequency of written opinions in claim construction beginning in 1995.

182. There are several potential reasons that parties brought more appeals involving claim construction issues. One reason, which is consistent with doctrinal reallocation, is that the parties recognized the court's elevation of the doctrine in importance. If parties know the court believes an issue is important, it is not surprising that it is frequently raised.

183. It is possible that the increase in Rule 36 is mere happenstance, or alternatively, due to an increase in the quality of the briefs submitted by the parties. However, because the timing of the increase so closely corresponds to *Markman*, these other explanations appear unlikely.

184. See Kimberly A. Moore, *Markman Eight Years Later: Is Claim Construction More Predictable?*, 9 LEWIS & CLARK L. REV. 231, 234–35 (2005).

recording important discussion or criticisms of settled rules.¹⁸⁵ The court spends more time drafting a precedential opinion because it binds future appellate panels as precedent.¹⁸⁶ Non-precedential opinions, also known as unpublished opinions, are citable by litigants but do not serve as precedent in the district or appellate court.¹⁸⁷ The main rationale for unpublished opinions is that they conserve judicial resources.¹⁸⁸ They are typically shorter with less discussion of the facts. All federal courts of appeal utilize non-precedential opinions to some extent.¹⁸⁹ Courts can choose which opinions to make precedential or non-precedential.

Increasing the proportion of precedential opinions may increase the importance of the doctrine. Precedential opinions signal that the appellate court considers the doctrine significant. To increase the importance of claim construction, the Federal Circuit increased the percentage of precedential written opinions after *Markman*.

There are other possible reasons a court may increase the number of written opinions or the designation of precedential opinions. For example, it could be that a new, fledgling doctrine needs to be fleshed out more in case law. It is doubtful that this rationale applies to claim construction, even though a new actor—the judge—was given responsibility for the task. The Federal Circuit articulated the canons of claim construction in numerous

185. William L. Reynolds & William M. Richman, *Limited Publication in the Fourth and Sixth Circuits*, 1979 DUKE L.J. 807, 808; *see also* William M. Richman & William L. Reynolds, *Appellate Justice Bureaucracy and Scholarship*, 21 U. MICH. J.L. REFORM 623, 632–33 (1988); William L. Reynolds & William M. Richman, *The Non-precedential Precedent—Limited Publication and No-Citation Rules in the United States Courts of Appeals*, 78 COLUM. L. REV. 1167, 1182–83 (1978).

186. *See* Lauren K. Robel, *Caseload and Judging: Judicial Adaptations to Caseload*, 1990 BYU L. REV. 3, 50.

187. FED. R. APP. P. 32.1 was amended in 2007 to require all circuit courts to permit citation of unpublished opinions. Before 2007, some circuits permitted citation of unpublished opinions without limitation and some discouraged their citation. For a good list of the differences among circuits pre-2007, *see* Robert T. Reagan, *Citing Unpublished Federal Appellate Decisions Issued Before 2007*, FEDERAL JUDICIAL CENTER (Mar. 9, 2007), http://www.uscourts.gov/uscourts/RulesAndPolicies/rules/Unpub_Opinions.pdf.

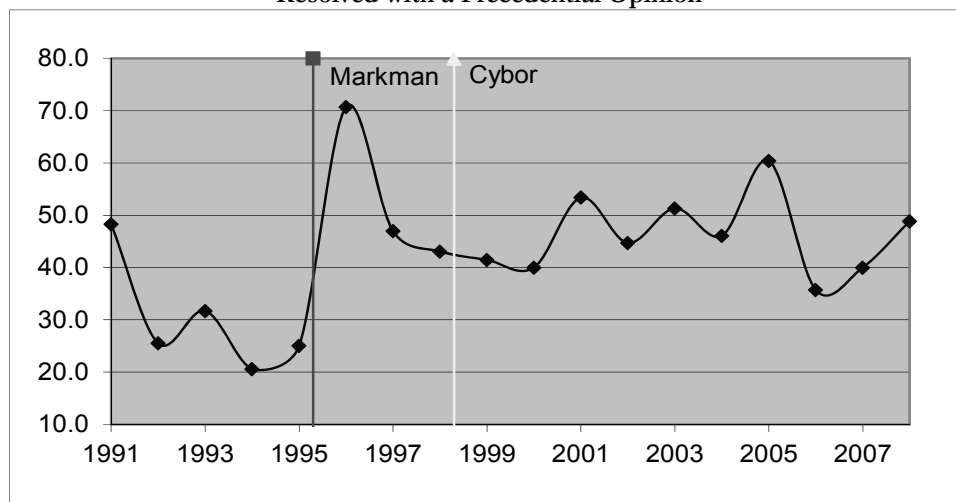
188. *See, e.g.*, William L. Reynolds & William M. Richman, *Studying Deck Chairs on the Titanic*, 81 CORNELL L. REV. 1290, 1293 (1996) (stating that increased judicial caseload required limited publication of cases).

189. Penelope Pether, *Constitutional Solipsism: Toward a Thick Doctrine of Article III Duty; or Why the Federal Circuits' Nonprecedential Status Rules Are (Profoundly) Unconstitutional*, 17 WM. & MARY BILL RTS. J. 955, 960 (2009) (“[T]he percentage of federal appellate decisions that are unpublished presently runs at almost eighty-five percent . . .”).

cases before *Markman*.¹⁹⁰ Furthermore, if the doctrine merely needed to be fleshed out, the increase in precedential opinions should be temporary, ending when the doctrine was sufficiently developed. Consequently, more precedential opinions over a long period of time may signal the increased salience of the doctrine.

Turning now to the empirical data, Figure 5, *infra*, shows the percentage of claim construction appeals resolved by a precedential opinion from 1991 until 2008.

Figure 5: Percentage of Claim Construction Appeals Resolved with a Precedential Opinion



After controlling for potentially explanatory variables in a multiple regression model, the results are statistically significant; it was more than twice as likely for the Federal Circuit to issue a precedential opinion after *Markman I* than before.¹⁹¹ Beginning in 1996, there was a spike in the percentage of claim construction appeals that were resolved via precedential

190. See generally 5A DONALD S. CHISUM, CHISUM ON PATENTS § 18.03[2][a] (rev. 2007) (identifying twelve examples of canons of claim construction and providing citations of case authority for the canons dating back until the 1930s).

191. The regression details can be found in Table 5a in the Appendix. The control variables are the geographic location of the district court (i.e., which Circuit the district court resided in); whether the district court was in one of the ten busiest patent districts during the given year; the technology of the underlying patent (chemical, mechanical, or electrical), the procedural posture of the district court judgment (preliminary injunction, summary judgment, jury trial, or bench trial), and winner at the district court (patentee or accused infringer). The odds ratio is 2.35 with a p-value of 0.000, meaning that it is 135% more likely at the mean. The second regression controlling for overall Federal Circuit patent docket could not be performed. It was not feasible to gather data on precedential opinions on all areas of law.

opinions. Non-precedential opinions and summary affirmances are two different methods of deciding cases without a precedential opinion.

In doctrines such as claim construction that are based upon guidelines rather than rules, precedent is especially important in teaching how to properly decide cases.¹⁹² Precedent binds future court panels. In theory, as the volume of precedents increases, courts should be more likely to find a prior opinion that matches or nearly matches the facts at hand.¹⁹³ After the 1996 spike, the level of precedential opinions remained elevated compared to the pre-*Markman* levels. More specifically, in the years before *Markman* (1991–1994), the Federal Circuit decided 30.5% of claim construction appeals with precedential opinions. But, in the years afterwards (1997–2003), the Federal Circuit decided 46.5% with precedential opinions. Some may argue that increased precedential opinions were necessary to develop the claim construction doctrine after *Markman* clarified that it was a matter of law. However, the Federal Circuit articulated the various canons of claim construction in numerous cases before 1995.¹⁹⁴ Furthermore, this would not explain why there is still, fifteen years after *Markman I*, an elevated level of precedential opinions. Today, the Federal Circuit has explained each of the canons in numerous post-*Markman* opinions.

Thus, the Federal Circuit increased the number of written and precedential claim construction opinions after *Markman*. Since the Federal Circuit arguably desired litigants and district court judges to focus on claim construction, it appears to be a reasonable and prudent decision to increase the body of case law analyzing that issue. Now, almost fifteen years after *Markman*, there are a plethora of precedential claim construction opinions.

3. *Reallocation Hypothesis #3: After Cybor, a greater proportion of appeals were from grants of summary judgment*

The third hypothesis asserts that a greater proportion of appeals that reach the Federal Circuit were from grants of motions for summary

192. Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 577–78 (1992) (discussing the role of precedent when standards are utilized).

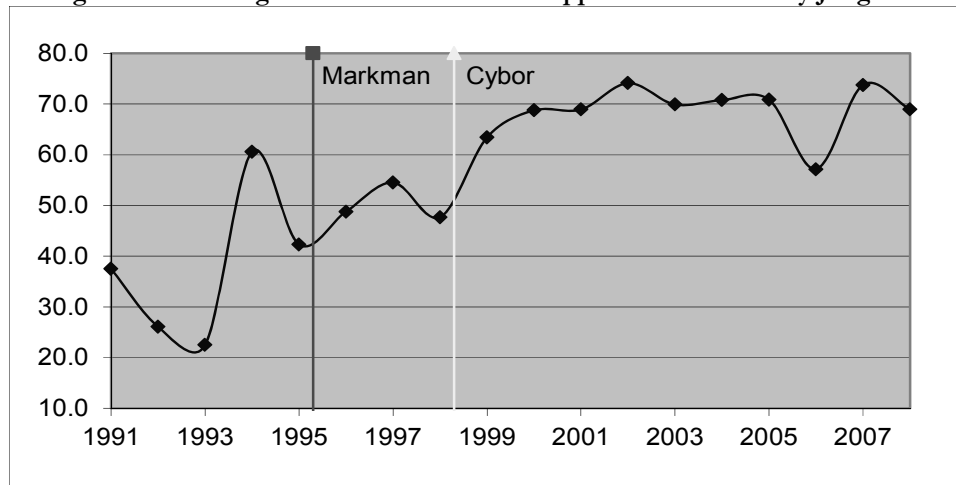
193. See David Luban, *Settlements and the Erosion of the Public Realm*, 83 GEO. L.J. 2619, 2622–23 (1995) (arguing that the rules and precedents resulting from litigation have “obvious importance for guiding future behavior and imposing order and certainty”).

194. See generally 5A CHISUM, *supra* note 190, § 18.03[2][a] (identifying twelve examples of canons of claim construction and providing citations of case authority for the canons dating back until the 1930s). To be fair, there were some short-lived intra-circuit disputes about how to perform claim construction. Holbrook, *supra* note 27, at 146–48 (noting the court’s struggle between the *Vitronics* and *Texas Digital* methodologies). However, the level of precedential opinions has been relatively constant, not tied to particular disagreements.

judgment. As the claim construction doctrine became more important, it was dispositive in more cases. District court judges could more easily grant summary judgment because of the horizontal reallocation. In patent cases, there is often less dispute over the structure of the accused product than there is concerning the construction of the patent. Because claim construction is a matter of law, it is resolved without using the summary judgment standard, namely, all inferences to the non-moving party. Once the primary battle on claim construction is resolved, the remaining issues on literal infringement are more straightforward.¹⁹⁵ The vertical reallocation also encouraged resolution by summary judgment. Because the district court judges understood that their decisions would be reviewed on appeal using a *de novo* standard, they desired to resolve the cases quicker. Finally, as the doctrine became more important and more central to patent law, district courts could entirely dispose of more cases after construing the claims.

The data reflects that the percentage of claim construction appeals decided by summary judgment increased over time. Figure 6, *infra*, shows the percentage of claim construction appeals that arose from district court summary judgment orders.

Figure 6: Percentage of Claim Construction Appeals from Summary Judgment



As claim construction became more important, a greater percentage of appeals reviewed summary judgment decisions as opposed to the results of bench trials, jury trials, or rulings on preliminary injunctions. This data is

195. Literal infringement and claim construction may be seen as doctrinally linked after *Markman I.*

consistent with data from other researchers arguing that *Markman* encouraged summary judgment in patent cases.¹⁹⁶

The multiple regression model indicates that it was over one hundred percent more likely for the appeal to be from a grant of summary judgment after *Cybor* than before.¹⁹⁷ As can be seen from Figure 6, less than forty percent of claim construction appeals were from summary judgment during the period from 1991 until 1993. The first increase in appeals from summary judgment occurred before *Markman I* in 1994. Looking at this data alone, it does not appear that *Markman I* by itself immediately caused the increase in summary judgments. Instead, a temporary increase appears just before *Markman I*, and a sustained increase appears around 1998, the time of the *Cybor* decision.

However, there is a natural time lag in the litigation process. The appeal process itself takes approximately one year, and the trial court proceedings longer than that.¹⁹⁸ Considering this delay, the possibility that the increase in appeals from summary judgment is due to *Markman* cannot be excluded. After 1998, the percentage of claim construction appeals from summary judgment sharply increased to almost seventy percent. It thereafter remained substantially constant. In the last ten years, approximately seventy percent of appeals of claim constructions arose in the summary judgment context. Others reported similar increases in summary judgment in patent litigation, even beyond claim construction. For example, Petherbridge, in his findings, noted a trend toward an increased percentage of appeals from a finding of summary judgment of non-infringement.¹⁹⁹ Data on whether district courts issued fewer summary judgments in earlier years are not readily available.

196. Allison & Lemley, *supra* note 2, at 958 (noting that *Markman* drives summary judgments); Burk & Lemley, *supra* note 26, at 1795 (asserting that *Markman* increased summary judgment); Lee & Krug, *supra* note 131, at 59 (observing that the *Markman* decisions could encourage summary proceedings); Petherbridge, *Claim Construction Effect*, *supra* note 2, at 243.

197. The results of the regression can be found in Table 6a in the Appendix. The control variables are the same as those for precedential opinions described *supra* note 191. The odds ratio for this regression is 3.38 with a p-value of 0.000.

198. 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, 282–83 (2005) (noting that the average trial court patent case, including and weighted down by those which settled early, pended well over a year).

199. Petherbridge, *Doctrine of Equivalents*, *supra* note 2, at 1394; *see also* Mary A. Woodford, Presentation to Ropes & Gray LLP: Preliminary Analysis of IPLC Data: Patent Infringement Cases 13 (June 2009) (on file with author) (reporting fifty-six percent of patent cases filed between 2000 and 2008 and which reached judgment were decided by summary judgment).

The rise in summary judgment since *Markman* is not surprising. First, as Allison and Lemley argued, once the district court judges spent time evaluating patent claims, it was only natural for them to attempt to resolve the case. In fact, many judges only construed the claims in the context of dispositive motions. Further, summary judgment may be appropriate in a large number of these cases. Once the judges construed the claims, there will not be a genuine issue of material fact in cases where the parties do not dispute the structure or function of the accused device or method. Second, as discussed in Section II.B.2, the doctrinal displacement of the doctrine of equivalents followed the reallocation in claim construction. The doctrine of equivalents was historically a quintessential jury issue. By reducing the importance of this doctrine, judges could grant more summary judgment motions. Third, the increased importance of claim construction and the reduced importance of the doctrine of equivalents may motivate both courts and litigants to resolve cases via summary judgment. The Federal Circuit's high claim construction reversal rate is well known.²⁰⁰ The Federal Circuit also does not review claim constructions through an interlocutory appeal.²⁰¹ Summary judgment permits quick review by the Federal Circuit, a goal often shared by both litigants and the district court.²⁰²

The doctrinal reallocation in patent law had other effects. Overall, the reallocation focused resources—of the Federal Circuit, of district courts, and of litigants—more on a single issue in the case. Many believe that claim construction ought to be central to patent litigation. By focusing resources on this one issue, the end product is better-organized Federal Circuit opinions. Before and immediately after *Markman*, the Federal Circuit issued often-confusing claim construction opinions.²⁰³ The Federal Circuit would blend claim construction and infringement discussions. Now the Federal Circuit's claim construction opinions are better written and more

200. *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 469 F.3d 1039, 1040 (Fed. Cir. 2006) (Michel, C.J., dissenting) (noting the problem in claim construction of “a steadily high reversal rate”).

201. See, e.g., V. Ajay Singh, *Interlocutory Appeals in Patent Cases Under 35 U.S.C. § 1292(c)(2): Are They Still Justified and Are They Implemented Correctly?*, 55 DUKE L.J. 179, 196 (2005) (“The Federal Circuit has thus far refused to hear permissive appeals related to claim construction.”).

202. Kathleen M. O'Malley et al., *A Panel Discussion: Claim Construction from the Perspective of the District Judge*, 54 CASE W. RES. L. REV. 671, 681 (2004).

203. An old, illustrative case is *Morton Int'l, Inc. v. Cardinal Chem. Co.*, 959 F.2d 948 (Fed. Cir. 1992). In *Morton*, the opinion has an unlabeled background section. It follows with a discussion containing a section labeled I, but no other subsections. Section I blends claim construction and literal infringement and also addresses attorneys' fees under 35 U.S.C. § 285.

organized.²⁰⁴ The clearer organization after *Markman* aids the reader, whether it is district court judges or potential litigants, in following the courts' reasoning.

B. DOCTRINAL DISPLACEMENT HYPOTHESES AND RESULTS

This Section examines hypotheses and data that suggest that the doctrine of equivalents has been displaced by claim construction. Turning back to the theory, doctrinal displacement suggests that claim construction should have displaced another doctrine. The Federal Circuit horizontally reallocated the doctrine of claim construction to the judge, vertically reallocated the standard of review to de novo, and raised the profile and importance of the claim construction doctrine. Raising the importance of claim construction meant that more litigants would elect to focus on it. This caused a displacement of other doctrines in patent law. The first hypothesis is that as claim construction became more important, the doctrine of equivalents became less important.

1. *Displacement Hypothesis #1: After Markman I, the frequency with which the Federal Circuit analyzed the doctrine of equivalents decreased and claim construction increased*

According to displacement theory,²⁰⁵ three influences—litigation constraints, judicial constraints, and the gatekeeping nature of claim construction—together caused a displacement of the doctrine of equivalents. Courts used claim construction to resolve all claim scope issues. District court judges began to rely more on summary judgment of non-infringement. Litigants subsequently must have learned that the doctrine of equivalents was unlikely to prevail; consequently, arguments relating to the doctrine of equivalents were dropped or downplayed in many briefs. Because claim construction consumed more words, less space was left for other issues.²⁰⁶ This hypothesis will be evaluated by analyzing the issues addressed in Federal Circuit written opinions in patent infringement appeals over selected years.

204. An exemplary recent case is *Baldwin Graphic Systems, Inc. v. Siebert, Inc.*, 512 F.3d 1338 (Fed. Cir. 2008). There, the opinion consists of three parts: (1) a background description of the technology and proceedings in the district court; (2) a detailed discussion of the claim construction dispute and resolution; and (3) a brief conclusion that a grant of summary judgment must be vacated because of an erroneous claim construction. *Id.*

205. *See supra* Section II.B.

206. While traditionally a jury issue, the doctrine of equivalents can be resolved on summary judgment if one of the legal limitations to the doctrine of equivalents applies, or if there is no disputed issue of material fact. Consequently, when evaluating appeals of judgments for non-infringement, the Federal Circuit must consider the doctrine of equivalents, if raised by the patentee.

After *Markman*, the frequency with which the Federal Circuit discussed the doctrine of equivalents should have dropped because litigants did not press it on appeal.

Previous scholars have noted the decline of the doctrine of equivalents; yet, there is debate on the cause and timing of its demise. As noted *supra*, Allison and Lemley argue that *Markman* itself ended the doctrine of equivalents.²⁰⁷ They assert that after a judge construes the claims and concludes that the accused product is not within the literal scope of the claims, the judge likely desires to resolve the case on summary judgment. To completely resolve the case requires that the judge also conclude that the product is not equivalent. Petherbridge argues that *Festo* appeared to be a tipping point for the doctrine of equivalents, showing that after *Festo*, a patentee's success rate on appeal on the doctrine of equivalents significantly dropped. Thus, Allison and Lemley disagree with Petherbridge as to the triggering event of the decline of the doctrine of equivalents.

The present Article cannot conclusively resolve the debate. Both scholars may be partially correct. However, along with a new theoretical framework to understand the decline of the doctrine of equivalents, it presents some additional evidence on this question. The new data supports the view that at least part of the decline occurred immediately after the increased importance of claim construction. The doctrine of equivalents may have continued its decline after *Festo*. As discussed in Section IV.A, *supra*, the doctrinal reallocation of claim construction resulted in claim construction becoming more important in patent litigation. Shifting the importance of a single doctrine has larger implications in real-world litigation, and the claim construction shift preceded a decline in the significance of the doctrine of equivalents.

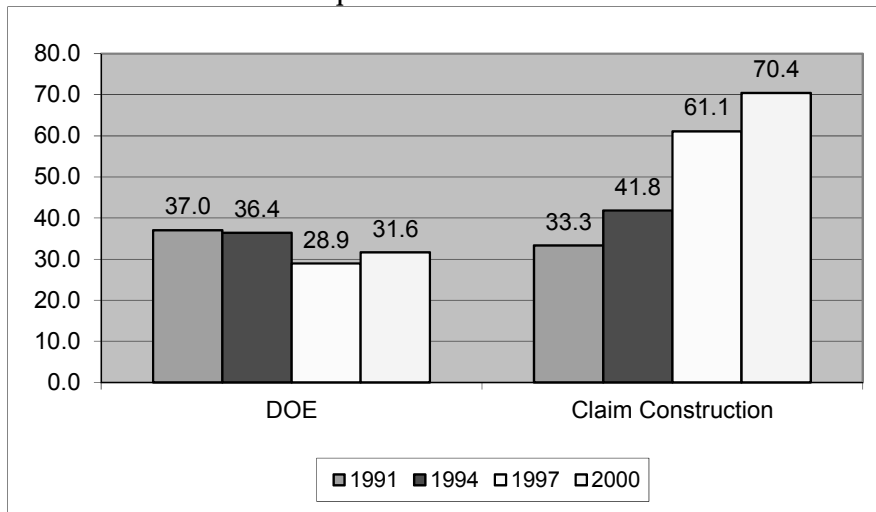
The doctrine of equivalents appears to have been in a more prominent position before *Markman*. When reading the opinions issued from 1991 until 1995, the author found that the Federal Circuit addressed the doctrine of equivalents more frequently during that time period than the present time. In particular, the Federal Circuit often discussed the doctrine of equivalents in robust detail, much the way the Federal Circuit discusses claim construction today. Sometimes the Federal Circuit discussed the doctrine of equivalents in the same breath as claim construction. Additionally, claim construction was less important in patent litigation pre-*Markman*. Unlike patent litigation today, patentees then did not focus on the claim language to prove their charges of infringement. Instead, they presented arguments to the jury about

207. *Supra* Part I.

the “invention” and attempted to divorce the “invention” from the specific claim language.

Figure 7, *infra*, displays the prevalence of claim construction and the doctrine of equivalents before the Federal Circuit in 1991, 1994, 1997, and 2000.²⁰⁸

Figure 7: Percentage of Federal Circuit Written Opinions Analyzing the Doctrine of Equivalents and Claim Construction



The most striking aspect of Figure 7 is the increase in claim construction at the Federal Circuit. Before *Markman*, claim construction appeared in less than fifty percent of appellate decisions, as shown in the left two bars. After *Markman*, it substantially increased, reaching seventy percent of decisions by 2000.²⁰⁹ During the same time period, the doctrine of equivalents declined, albeit less dramatically. While the results surrounding the doctrine of equivalents are not statistically significant, the general trend is not in the wrong direction. These results reflect a limited sample of cases.

One reason why a larger drop in the doctrine of equivalents is not evident relates to the increase in appeals from grants of summary judgment of non-infringement. In order to grant summary judgment of non-infringement, the district court must determine that there is no issue of

208. The percentage is based upon the number of opinions raising the issue/doctrine relative to the total number of merits opinions for the year.

209. Claim construction is a gatekeeper doctrine that may be present in invalidity and infringement discussions, while the doctrine of equivalents may be present only in infringement discussions. However, claim construction always had this status as a gatekeeper; *Markman* did not start it. Consequently, the gatekeeper status cannot explain the difference between the rates before and after *Markman*.

material fact to either literal infringement or the doctrine of equivalents. To affirm, the Federal Circuit should mention, at least briefly, both bases of the district court's ruling. There was a large jump in appeals from orders granting summary judgment of non-infringement from 1991 until 2000. Considering all merits appeals in the appellate issue database, appeals from summary judgments of non-infringement comprised 13.0% of 1991 opinions, 20.0% of 1994 opinions, 28.9% of 1997 opinions, and 46.9% of 2000 opinions. Consequently, changes in summary judgment practice in patent litigation, perhaps driven by *Cybor*, may have played a role in inflating the number of doctrine of equivalents arguments raised in later years. This is consistent with the judicial constraints explanation for displacement.

The coding mechanism used in the appellate issue database may also partially explain why the drop in the doctrine of equivalents appears modest. Each issue raised in the appellate decision was weighted equivalently. For example, if the Federal Circuit discussed doctrine of equivalents for a paragraph and claim construction for five pages, the database coded each doctrine the same.

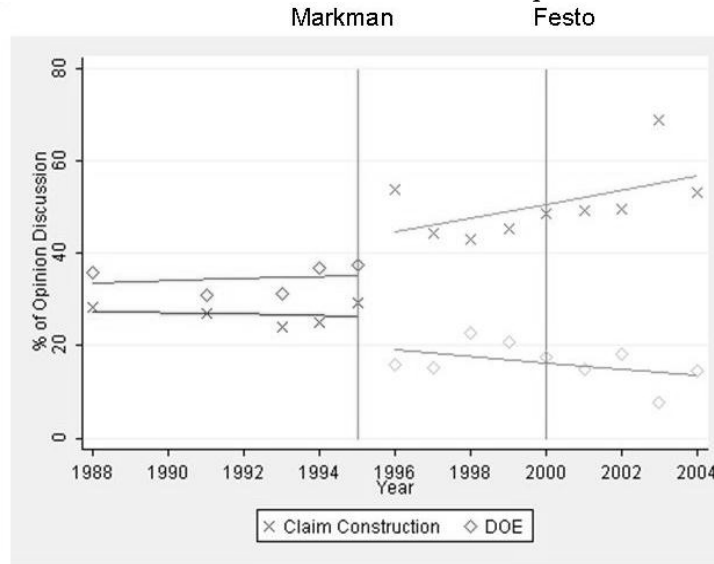
2. *Displacement Hypothesis #2: After Markman I, the Federal Circuit discussed the doctrine of equivalents in fewer words, and claim construction with more words*

The second displacement hypothesis was tested using the word count appellate database. Word count data permits analysis of displacement in greater detail and overcomes the aforementioned limitation of the appellate issue database. Even when the Federal Circuit analyzed the doctrine of equivalents by the Federal Circuit after *Markman*, it should occupy less space in the opinions. Decreased word count can support the hypothesis, assuming that word count is a proxy for importance or at least a proxy for how much analysis the court deemed sufficient for explanation and resolution of an issue.²¹⁰

210. Other studies have used word count as a rough proxy for importance. See, e.g., Barton Beebe, *An Empirical Study of U.S. Copyright Fair Use Opinions, 1978–2005*, 156 U. PA. L. REV. 549, 587 (2008) (analyzing word count data because “in explaining (or defending) their analysis of a legal issue, judges are generally more likely to dedicate a greater share of their explanations to considerations that they deem to be more important”); Jennifer L. Groscup et al., *The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases*, 8 PSYCHOL. PUB. POL’Y & L. 339 (2002); Hall & Wright, *supra* note 147, at 117 (“For instance, some studies count the number of words or paragraphs devoted to discussing particular factors as an indication of the factors’ relative importance.”); Carl W. Roberts, *A Conceptual Framework for Qualitative Text Analysis*, 34 QUALITY & QUANTITY 259, 263 (2000) (“Analyses of word-counts yield inferences about the predominance of themes in texts.”);

Figure 8, *infra*, shows the word count of summary judgment opinions involving claim construction and the doctrine of equivalents over time. As described in more detail in Section III.A.3, *supra*, the percentages were calculated by dividing the number of words in the opinion addressing claim construction or the doctrine of equivalents by the number of words in the “Discussion” section of the opinion addressing all issues on appeal.²¹¹

Figure 8: Percentage of Words Devoted to Claim Construction and Doctrine of Equivalents



The vertical lines at 1995 and 2000 in Figure 8 represent *Markman I* and *Festo*. It is important to remember that the word count appellate database only includes resolutions from summary judgment so juries did not evaluate either issue in the district court in any of the observations.

Figure 8 shows that the doctrine of equivalents occupied about a third of the discussion of Federal Circuit opinions before *Markman I* while claim construction entailed about a quarter of the opinions. During this time period, the doctrine of equivalents averaged a slightly greater percentage of the words than claim construction. After *Markman I*, the percentage of words devoted to the doctrine of equivalents dropped off, and varied from

Paul J. Wahlbeck, *The Development of a Legal Rule: The Federal Common Law of Public Nuisance*, 32 L. & SOC'Y REV. 613 (1998).

211. The yearly percentage was calculated by averaging the percentages for each decision within the year. If the yearly percentage was calculated by averaging the total number of relevant words in the opinions, then a few long opinions in a given year would skew the results. In other words, an opinion with a large word count would have a disproportionate influence on the overall results.

approximately twelve percent to approximately twenty-five percent. In contrast, during the same time period, claim construction increased in terms of the percentage of words in an opinion. From 1996 until 2000, claim construction comprised between forty and fifty-five percent of the opinions each year. Before *Markman I*, it encompassed between twenty and thirty percent of opinions. These results are statistically significant.²¹²

To keep this result in the proper context, the total word count in the discussion section of opinions varied slightly over time. It increased approximately ten percent from the pre-*Markman I* period until *Festo*, and approximately another ten percent from *Festo* until the end of 2004.²¹³ So while the opinions increased in size, the increase was not substantial and most likely does not account for the change in word count of claim construction and the doctrine of equivalents around these events. And more importantly, the word count devoted to the doctrine of equivalents decreased while the count for claim construction increased.

This data supports the view that doctrinal displacement occurred after doctrinal reallocation and the doctrine of equivalents became less significant after *Markman*.²¹⁴ The drop in Figure 8 after *Markman* is significant. The trend continued after *Festo*, with the doctrine of equivalents becoming more marginalized, and claim construction more important.

However, patent litigation is complex and word count information cannot fully capture the significance of the doctrines. There may be multiple confounding factors a word count analysis cannot decode. For example, the data does not control for changes in complexity and difficulty in analyzing claim construction or the doctrine of equivalents, if any, over time. Nonetheless, the data is consistent with Allison and Lemley's narrative that

212. The results of a t-test suggest a statistically significant difference between the proportion of the word count devoted to claim construction before and after the *Markman* opinion had been issued ($t=-3.9403$, $p=0.0001$). The results of a t-test also suggest a statistically significant difference between the proportion of the word count devoted to the doctrine of equivalents before and after the *Markman* opinion ($t=2.9810$, $p=0.0033$). Because the distribution of the proportions of doctrine of equivalents word counts was not normal (in contrast to the proportions for claim construction, which were), two alternative statistical tests were performed. Both of these tests, a Wilcoxon-Mann-Whitney test ($z=2.679$, $p=0.0074$) and a general linear model ($z=-2.89$, $p=0.004$), provide the same result.

213. The average discussion section before *Markman I* was 3154 words, between *Markman I* and *Festo*, it was 3483 words, and after *Festo* until the end of 2004 it was 3876 words. That works out to a 10.4% increase after *Markman I* and an 11.3% increase after *Festo*.

214. Scholars have used word count as a proxy for measuring the importance of an issue in legal opinions. See, e.g., sources cited *supra* note 210.

the doctrine of equivalents became less important as claim construction became more so.

Some may assert that when a doctrine becomes more important, it is natural for a court to temporarily increase the word count devoted to that doctrine.²¹⁵ The court in these circumstances needs to explain the enhanced doctrine to litigants and lower courts. This account does not completely explain the results of the present study. Figure 8 shows that the increase in word count for claim construction was not an aberration lasting only a few years. In fact, over time, claim construction occupied more and more decision space.²¹⁶ Similarly, some may argue that the increasing complexity of technologies and patents may explain the results.²¹⁷ However, the increasing complexity should affect both claim construction and the doctrine of equivalents.

This data, while only one way of analyzing the events, supports the view that the doctrine of equivalents dropped in importance as claim construction increased. The same trend can be analyzed by scrutinizing the opinions themselves. For example, in the illustrative 1994 case *Wolverine World Wide, Inc. v. Nike, Inc.*,²¹⁸ the Federal Circuit affirmed a district court's grant of summary judgment of non-infringement.²¹⁹ The court first considered the district court's claim construction of the term "forefoot-enveloping."²²⁰ The court affirmed the claim construction with a three-paragraph discussion over the space of a page and a half.²²¹ The court then disposed of the patentee's literal infringement appeal in two paragraphs.²²² Finally, the Federal Circuit rejected the patentee's doctrine of equivalents appeal.²²³ The doctrine of equivalents analysis, although only two paragraphs in length, was more thorough than the court's analysis on other issues. The detailed analysis examined two portions of the specification of the patent-in-suit and

215. The same can be said if the doctrine merely changes or becomes uncertain.

216. Furthermore, the variance in average word counts of the "Discussion" sections over time does not appear to cause the results. There is some variance in the yearly word count averages. The average word count of the "Discussion" sections of the opinions over this ten-year period was approximately 3300 words. The average for eight of the ten years fell within a relatively narrow band of the overall average, within twenty percent of 3300. The data for two years fell outside this band, 1994 being lower and 1998 being higher.

217. Allison & Lemley, *supra* note 24, at 79 (noting increased complexity in patents from the 1970s when compared to those from the 1990s).

218. 38 F.3d 1192 (Fed. Cir. 1994).

219. *Id.* at 1194.

220. *Id.* at 1196–98.

221. *Id.*

222. *Id.* at 1198–99.

223. *Id.* at 1199–2000.

compared how the patented invention operated with the accused products.²²⁴ After that analysis, the court affirmed the district court's holding.²²⁵

In more recent cases, the doctrine of equivalents plays a lesser role, especially when compared to claim construction. For example, in *Welker Bearing v. PHD*, the Federal Circuit reviewed an opinion granting summary judgment of non-infringement.²²⁶ After setting forth details about the patented technology and the district court proceedings, the opinion devoted nearly five pages to the issue of claim construction.²²⁷ The term in dispute was "mechanism for moving said finger."²²⁸ The court devoted nearly two pages discussing whether the claim was in means-plus-function format, eventually concluding that the claim included language in means-plus-function format.²²⁹

Thereafter, the *Welker Bearing* opinion delves into the details of the claim construction for three solid pages of analysis.²³⁰ The Federal Circuit considered the patent specification, explicitly reciting and analyzing information provided in six locations in the patent specification.²³¹ It discussed the claim construction doctrines: claim differentiation, ordinary meaning and clear disavowal of claim scope.²³² Finally, the Federal Circuit affirmed the district court's claim construction.²³³ As for literal infringement, the opinion contains two paragraphs disposing of the issue.²³⁴ In those two paragraphs, the Federal Circuit affirmed the district court's conclusion of no literal infringement.²³⁵

Finally, the Federal Circuit reached the doctrine of equivalents.²³⁶ In affirming the district court's grant of summary judgment, the Federal Circuit opinion included only two paragraphs relating to the doctrine of equivalents.²³⁷ As described above, the Federal Circuit's current opinions focus much less on the doctrine of equivalents than pre-*Markman* opinions. The lack of Federal Circuit focus supports the declining importance of the

224. *Id.*

225. *Id.* at 2000.

226. *Welker Bearing Co. v. PHD, Inc.*, 550 F.3d 1090 (Fed. Cir. 2008).

227. *Id.* at 1095–99.

228. *Id.* at 1095.

229. *Id.* at 1095–97.

230. *Id.* at 1097–99.

231. *Id.* at 1098–99.

232. *Id.* at 1099.

233. *Id.*

234. *Id.*

235. *Id.*

236. *Id.*

237. *Id.* at 1099–1100.

doctrine of equivalents. As discussed *infra*, this decline—whether the direct result of the increased prominence of the claim construction doctrine, substantive changes to the law of the doctrine of equivalents, or some combination of the two—is consistent with doctrinal reallocation.

This decline of the doctrine of equivalents is partially attributable to the case law's development of limitations on the doctrine of equivalents. The Supreme Court and the Federal Circuit decided several doctrine of equivalents cases.²³⁸ These legal limits provided substantive changes in the doctrine. A substantive change can directly increase or decrease the importance of the doctrine. If a decrease in significance occurs, litigants may raise the doctrine less frequently.

Alternatively, these case law developments may be thought of as another doctrinal reallocation—moving part of the decision-making on the doctrine of equivalents from the jury to the judge. Shifting to judicial decision-making provides the court control to decide the importance of a doctrine. In contrast to claim construction, the Federal Circuit used its control to diminish the doctrine of equivalents. Petherbridge showed that the Federal Circuit reversed district court holdings of infringement under the doctrine of equivalents and affirmed district court rejections of such infringement.²³⁹ In other words, the Federal Circuit used its institutional power to weaken the doctrine of equivalents after its doctrinal reallocation.

The conclusions reached by this study are consistent with the conclusions of Allison, Lemley, and Petherbridge. Federal Circuit opinions reduced emphasis on the doctrine of equivalents after *Markman*.²⁴⁰ Patentees have little success on the doctrine of equivalents after *Markman*.²⁴¹ The doctrine of equivalents has lost power as claim construction increased in prominence and importance within patent law.²⁴² However, further study is needed on the exact timing of the decline of the doctrine of equivalents. It is still unclear how much of the decline followed *Warner-Jenkinson* and *Festo*, and how much already occurred before these decisions.

238. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722 (2002); *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17 (1997); *Johnson & Johnston Assocs. v. R.E. Serv. Co.*, 285 F.3d 1046 (Fed. Cir. 2002) (en banc); *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558 (Fed. Cir. 2000) (en banc), *vacated*, 535 U.S. 722 (2002).

239. Petherbridge, *Doctrine of Equivalents*, *supra* note 2, at 1386–87, 1399.

240. *Id.* at 1394; Petherbridge, *Claim Construction Effect*, *supra* note 2, at 233.

241. Allison & Lemley, *supra* note 2, at 966–67; Petherbridge, *Doctrine of Equivalents*, *supra* note 2, at 1387.

242. Allison & Lemley, *supra* note 2, at 966–67; Petherbridge, *Claim Construction Effect*, *supra* note 2, at 233.

Claim construction opinions are of limited precedential value beyond interpreting the particular patent at issue. But others in the marketplace, such as competitors, are often interested in the construction of the terms of any litigated patent. Thus, appellate claim construction opinions are often valuable beyond the immediate parties to the litigation. In contrast, opinions on the doctrine of equivalents are not. The doctrine of equivalents analysis will be specific to each individual accused product. In most cases, the doctrine of equivalents analysis is not applicable to third parties. Consequently, it makes sense to devote more resources to claim construction information and opinions. That information is valuable to more entities than information on the doctrine of equivalents.

V. CONCLUSION

This Article provides a novel theoretical model and extensive empirical evidence to explain the decline of the doctrine of equivalents. In recent years, John Allison, Mark Lemley, and Lee Petherbridge studied the doctrine of equivalents. While these scholars noted and provided some evidence that the successful use of the doctrine of equivalents decreased, none clearly explained why. As such, the cause and precise mechanism behind the so-called “demise” of the doctrine of equivalents have largely remained a mystery.

This Article explains that the demise occurred because of two complementary forces discussed for the first time in this Article: doctrinal reallocation and doctrinal displacement. Under doctrinal reallocation, a substantive doctrine may become more important after a shift in adjudicative control over that doctrine. Doctrinal displacement posits that an increase in the importance of a doctrine may in turn decrease the importance of another, typically related, doctrine. This Article’s empirical results support the position that the demise of the doctrine of equivalents was a result of these twin forces.

The study of doctrinal reallocation and doctrinal displacement in the law and its after effects is merely beginning. Until this study, it has never been formally discussed or empirically examined. The present study uses the theories of doctrinal reallocation and doctrinal displacement to explain the demise of the doctrine of equivalents. Further study is warranted to see whether the phenomena can explain other changes in the law, in areas within and beyond patent law. And it raises the further important question: is doctrinal displacement intentional? Does the court know *ex ante* that doctrinal reallocation likely leads to doctrinal displacement? If the court does, it has never expressly acknowledged it.

The general theories of doctrinal reallocation and displacement may allow hypotheses on how proposed procedural changes will affect existing doctrines. For example, some have argued to remove the doctrine of obviousness in patent law from the control of the jury.²⁴³ What would be the likely consequences of such a change? Which doctrine would be displaced? Separately, what will happen if the pending patent reform bills²⁴⁴ are passed by Congress? Displacement theory can help find the answers.

243. Petition for Writ of Certiorari, *Medela AG v. Kinetic Concepts, Inc.*, 130 S. Ct. 624 (2009) (No. 09-198), 2009 U.S. S. Ct. Briefs LEXIS 806.

244. Patent Reform Act, S. 515, 111th Cong. (2009); Patent Reform Act, H.R. 1260, 111th Cong. (2009).

APPENDIX: DETAILED REGRESSION TABLES

Table 4a: Regression for Hypothesis #1: Written Opinions
(corresponding to Figure 4, page 1193)

Variable	Logistic Regression Odds Ratio (Std. Error) ²⁴⁵
Case decided before <i>Markman I</i>	2.861*** (.589)
District court in 2nd Circuit ²⁴⁶	1.098 (.426)
District court in 3rd Circuit	1.560 (.605)
District court in 4th Circuit	1.618 (.720)
District court in 5th Circuit	0.940 (.368)
District court in 6th Circuit	1.468 (.582)
District court in 7th Circuit	1.198 (.441)
District court in 8th Circuit	1.502 (.615)
District court in 9th Circuit	1.274 (.437)
District court in 10th Circuit	1.300 (.612)
District court in 11th Circuit	0.731 (.320)
District court in one of 10 busiest patent courts	1.133 (.177)
Chemical Patent (PTO class) ²⁴⁷	2.704*** (.569)
Electrical Patent (PTO class)	1.389 (.234)
Appeal from grant of summary judgment ²⁴⁸	1.427 (.334)
Appeal from bench trial	1.366 (.302)
Appeal from jury trial	0.475** (.135)
Patentee won at district court	1.309 (.249)
Pseudo R ²	.0569
# Obs	1247

245. *** Significant at the .001 level, ** Significant at the .01 level, * Significant at the .05 level, Standard errors in parentheses.

246. Base circuit is 1st Circuit.

247. Base technology is mechanical.

248. Base appeal is from preliminary injunction ruling.

Table 4b: Additional Logistic Regression for Hypothesis #1: Written Opinions
(corresponding to Figure 4, page 1193)

Variable	Logistic Regression Odds Ratio (Std. Error) ²⁴⁹
Case decided before <i>Markman I</i>	1.959*** (.193)
Case involved Claim Construction	0.510*** (.043)
Pseudo R ²	.0245
# Obs	4234

Table 5a: Regression for Hypothesis #2: Precedential Opinions
(corresponding to Figure 5, page 1197)

Variable	Logistic Regression Odds Ratio (Std. Error) ²⁵⁰
Case decided before <i>Markman I</i>	2.345*** (.490)
District court in 2nd Circuit ²⁵¹	1.595 (.541)
District court in 3rd Circuit	1.236 (.400)
District court in 4th Circuit	1.989 (.748)
District court in 5th Circuit	1.209 (.417)
District court in 6th Circuit	1.550 (.532)
District court in 7th Circuit	1.309 (.422)
District court in 8th Circuit	1.304 (.462)
District court in 9th Circuit	1.282 (.385)
District court in 10th Circuit	1.674 (.683)
District court in 11th Circuit	1.137 (.457)
District court in one of 10 busiest patent courts	1.089 (.148)
Chemical Patent (PTO class) ²⁵²	2.784*** (.437)
Electrical Patent (PTO class)	1.729*** (.251)
Appeal from grant of summary judgment ²⁵³	1.582* (.308)
Appeal from bench trial	1.358 (.243)
Appeal from jury trial	0.473** (.136)
Patentee won at district court	1.395* (.219)
Pseudo R ²	.0587
# Obs	1247

249. *** Significant at the .001 level, ** Significant at the .01 level, * Significant at the .05 level, Standard errors in parentheses.

250. *** Significant at the .001 level, ** Significant at the .01 level, * Significant at the .05 level, Standard errors in parentheses.

251. Base circuit is 1st Circuit.

252. Base technology is mechanical.

253. Base appeal is from preliminary injunction ruling.

Table 6a: Regression for Hypothesis #3: Summary Judgment
(corresponding to Figure 6, page 1199)

Variable	Logistic Regression Odds Ratio (Std. Error) ²⁵⁴	
Case decided before <i>Cybor</i>	3.383***	(.537)
District court in 2nd Circuit ²⁵⁵	1.136	(.428)
District court in 3rd Circuit	1.175	(.424)
District court in 4th Circuit	1.318	(.548)
District court in 5th Circuit	1.387	(.535)
District court in 6th Circuit	2.981**	(1.188)
District court in 7th Circuit	1.400	(.499)
District court in 8th Circuit	1.472	(.587)
District court in 9th Circuit	2.573**	(.866)
District court in 10th Circuit	1.230	(.561)
District court in 11th Circuit	1.203	(.543)
District court in one of 10 busiest patent courts	1.140	(.182)
Chemical Patent (PTO class) ²⁵⁶	0.797	(.142)
Electrical Patent (PTO class)	1.438*	(.254)
Patentee won at district court	0.084***	(.013)
Pseudo R ²	.2437	
# Obs	1262	

254. *** Significant at the .001 level, ** Significant at the .01 level, * Significant at the .05 level, Standard errors in parentheses.

255. Base circuit is 1st Circuit.

256. Base technology is mechanical.

