THE CLAIM CONSTRUCTION EFFECT

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I. INTRODUCTION

The experiment in institutional design embodied in the United States Court of Appeals for the Federal Circuit is passing its twenty-fifth anniversary.[1] During that time, the Federal Circuit has come to be a dominating force in the patent system.[2] There has been a dramatic

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1. The Federal Circuit was created by the Federal Courts Improvement Act of 1982. *See* Pub. L. No. 97-164, 96 Stat. 25 (relevant provisions codified as amended in scattered sections of Title 28 of the U.S. Code).

2. *See, e.g.*, Mark D. Janis, *Patent Law in the Age of the Invisible Supreme Court*, 2001 U. ILL. L. REV. 387, 387 (stating that the "Court of Appeals for the Federal Circuit . . . has become the de facto supreme court of patents"); Arthur J. Gajarsa & Lawrence P.

increase in the significance of patents to the national economy[3] and a concomitant increase in the court's visibility.[4]

The rise to prominence of the Federal Circuit is, however, no accident.[5] Rather, it is exactly what Congress intended. The premise of the Federal Circuit *is* widespread dissatisfaction with the confusion and uncertainty that followed from regional circuit involvement.[6] The

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Cogswell, III, *Foreword: The Federal Circuit and the Supreme Court*, 55 AM. U. L. REV. 821, 822 (2006) (reporting that until April 2006, the Supreme Court had granted certiorari in only sixteen patent cases).

3. *See* NAT'L RESEARCH COUNCIL OF THE NAT'L ACAD., PATENTS IN THE KNOWLEDGE-BASED ECONOMY (Stephen Merrill, Richard C. Levin & Mark B. Myers eds., 2004) (broadly discussing the economic significance of patents).

4. The court has recently been the subject of high profile reports, *see* NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., A PATENT SYSTEM FOR THE 21ST CENTURY (Stephen A. Merrill, Richard C. Levin & Mark B. Myers eds., 2004) (discussing the role of the Federal Circuit in the patent system); *see generally* FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY (2003), *available at* http://www.ftc.gov/os/2003/10/innovationrpt.pdf (addressing the role of the Federal Circuit in setting the appropriate balance between competition and patent law and policy), and popular literature, JAMES BESSEN & MICHAEL MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (Princeton Univ. Press 2008) (arguing that, inter alia, the Federal Circuit has helped to undermine innovation); ADAM B. JAFFE & JOSH LERNER, INNOVATION AND ITS DISCONTENTS (2004) (discussing and criticizing the performance of the court). Even some Federal Circuit Judges have noted the debate surrounding the court. Paul R. Michel, *The Court of Appeals for the Federal Circuit Must Evolve to Meet the Challenges Ahead*, 48 AM. U. L. REV. 1177, 1182–85 (1999) (addressing the debate over the Federal Circuit's increasing role). The court has also been involved in a number of high profile cases. A few recent ones include: MercExchange, L.L.C. v. eBay, Inc., 401 F.3d 1323, 1339 (Fed. Cir. 2005) (reversing the district court's denial of a permanent injunction against infringement), *vacated by* 126 S. Ct. 1837 (2006); Teleflex, Inc. v. KSR Int'l Co., 119 F. App'x 282 (Fed. Cir. 2005) (vacating the district court's grant of summary judgment on the ground of obviousness), *rev'd*, 127 S. Ct. 1727 (2007); NTP, Inc. v. Research in Motion, Ltd., 418 F.3d 1282 (Fed. Cir. 2005) (deciding a patent infringement lawsuit in part unfavorably against the makers of the Blackberry wireless email system).

5. For work considering the theoretical basis of the formation of the Federal Circuit, *see* Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1 (1989); *see also* Charles W. Adams, *The Court of Appeals for the Federal Circuit: More than a National Patent Court*, 49 MO. L. REV. 43 (1984) (noting that the Federal Circuit was formed in part to deal with the harmful effects that can arise from multiple federal appellate courts deciding matters arising from the same laws); Pauline Newman, *The Federal Circuit in Perspective*, 54 AM. U. L. REV. 821 (2005) (discussing the context of the creation of the Federal Circuit).

6. Legislators were confronted with evidence that the legal infrastructure of the patent system lacked order and coherence, *see* S. REP. NO. 97-275 at 5 (1981), *reprinted in* 1982 U.S.C.C.A.N. 11, 15 (reporting that "patent law [is] an area in which the application of the law to the facts of a case often produces different outcomes in different courtrooms in substantially similar cases"), that uncertainty in the patent system was harmful to innovation, *see id.* at 6, *reprinted in* 1982 U.S.C.C.A.N. at 16 (reporting the comments of Harry F. Manbeck, Jr., General Patent Counsel of the General Electric Company, who testified that doctrinal stability has an effect on innovation and that decreasing uncertainties is important to business decision-making), and that wasteful collateral litigation was rampant, *see id.* at 3–6, *reprinted in* 1982 U.S.C.C.A.N. at 15 (discussing claims that forum shopping "increases the cost of litigation

justification for the court follows somewhat naturally from this premise: establishing a more centralized[7] source of legal authority will produce a clearer, more stable, and more predictable legal infrastructure for the patent system.[8]

As the patent system has grown in terms of economic significance and complexity,[9] conventional wisdom suggests that Congress's structural goals have been realized. But while the Federal Circuit has expanded its influence over patent jurisprudence in a number of doctrinal areas,[10] no area of law has garnered more angst and attention than the

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and 'demeans the entire judicial process and the patent system as well' "). Studies also revealed marked disparities in patent adjudication across regional circuits. *See* Dreyfuss, *supra* note 5, at 7 (citing Thomas Cooch, *The Standard of Invention in the Courts*, *in* DYNAMICS OF THE PATENT SYSTEM 34, 56–59 (William B. Ball ed., 1960)), reporting that patents were "twice as likely to be held valid and infringed in the Fifth Circuit than in the Seventh Circuit, and almost four times more likely to be enforced in the Seventh Circuit than in the Second Circuit."). Coordinating guidance from the Supreme Court was not likely to be forthcoming; the Senate Report notes that at the time the Supreme Court was having difficulty with the size of its docket. *See* S. REP. NO. 97-275, at 3 (1981), *as reprinted in* 1982 U.S.C.C.A.N. 11, 13 (noting that the Supreme Court "appears to be operating at—or close to—full capacity; therefore, in the future the Court cannot be expected to provide much more guidance in legal issues than it now does."); *see also* Adams, *supra* note 5, at 45. This is consistent with the view that patent cases may have been avoided by the high court due to the high level of legal and technical difficulty presented by the subject matter. *See* Dreyfuss, *supra* note 5, at 6.

7. The Federal Courts Improvement Act unified jurisdiction over patent appeals in the Federal Circuit. Accordingly, patent appeals, whether from the U.S. Patent and Trademark Office, the U.S. district courts, the Court of Federal Claims, or the Court of International Trade, may now be heard by a single appellate court having national jurisdiction. *But see* Holmes Group, Inc. v. Vornado Air Circulation Sys., Inc., 535 U.S. 826 (2002) (returning jurisdiction to the regional circuits in limited circumstances, such as when plaintiff does not allege a patent-law cause of action, and defendant's answer contains a patent-law counterclaim).

8. *See* Comm'n on Revision of the Federal Court Appellate System, Structure & Internal Procedures: Recommendations for Change, *reprinted in* 67 F.R.D. 195, 219–20 (1975); S. REP. NO. 97-275, at 4–5 (1981), *reprinted in* 1982 U.S.C.C.A.N. 11, 14–15 (stating the benefits of more efficient administration of patent claims); *id.* ("[T]he Federal Circuit also provides a forum that will increase doctrinal stability in the field of patent law.").

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

10. *See, e.g.*, the standard for obviousness, Lee Petherbridge & R. Polk Wagner, *The Federal Circuit and Patentability: An Empirical Assessment of the Law of Obviousness*, 85 TEX. L. REV. 2051 (2007) (discussing the development of obviousness jurisprudence); Christopher A. Cotropia, *Nonobviousness and the Federal Circuit: An Empirical Analysis of Recent Case Law*, 82 NOTRE DAME L. REV. 911 (2007) (same); remedies, Dreyfuss, *supra* note 5, at 18–19; procedural issues, *see id.* at 30–52 (discussing some of the areas where the court has been influential); anticipation, *id.* at 10–11; the doctrine of equivalents, Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 234 F.3d 558 (Fed. Cir. 2000) (en banc), *vacated by* 535 U.S. 722 (2002); Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 62 F.3d 1512 (Fed. Cir. 1995) (en banc), *rev'd*, 520 U.S. 17 (1997); and inequitable conduct, Dreyfuss, *supra* note 5, at 21–22.

law of claim construction.[11] *Claim construction* refers to the task of construing, or interpreting, the words of patents' claims to establish the metes and bounds of a patent. Theoretically, the task of claim construction serves to operationalize the concept of "invention," which lies at the heart of the U.S. patent system.

In broad strokes, the U.S. patent system is founded on the normative principle that giving inventors property rights in their inventions—the exclusive rights[12] to make, use, sell, and import[13]—should promote innovation in the United States. As this statement suggests, the property rights granted are particularly with respect to an invention, a concept that, among other things, delimits the scope of the right to exclude. To determine the invention, U.S. patent law relies on textual definitions, i.e., claims set forth in the patent document.[14] Specifically, a patent's claims define the subject matter to which a patentee is entitled the right to exclude.

The task of claim construction requires translating the words of the claim into a meaningful technological context, so it is perhaps no surprise that claim construction presents one of the most difficult problems in patent law. Patents address intangible concepts, and the precision that has evolved in the definition of tangible property has proven difficult to reproduce for patents. The problem is exacerbated by the fact that the genus of patentable subject matter is at once vastly broader than that of

11. Claim construction is a topic of great scholarly interest. A search of the LEXIS—"US Law Reviews and Journals, Combined" database on February 13, 2009, with the terms "claim /2 constr! or interp! /100 patent," yielded 1529 hits. As this suggests, in the context of a law review article it is impossible to cite to all of the important contributions in this area. The reader will find citations to some of the most on point to this study scattered throughout this article. *See, e.g.*, *infra* notes 23, 24, 82; for a small sampling of some of the earlier papers in this area that concern themselves with the federal circuit's performance, *see, e.g.*, Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035 (2003) (arguing that the Federal Circuit's claim construction rules in the context of the patent system could lead to indeterminacy); 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, 67 (1999) (presenting the view that the *Markman* holding might lead to less predictability); Craig Allen Nard, *Process Considerations in the Age of* Markman *and Mantras*, 2001 U. ILL. L. REV. 355 (arguing for the use of interlocutory appeal); John M. Romary & Arie M. Michelsohn, *Patent Claim Interpretation After* Markman*: How the Federal Circuit Interprets Claims*, 46 AM. U. L. REV. 1887 (1997) (collecting case digests to predict the use of intrinsic evidence after *Markman*).

12. U.S. CONST. art. I, § 8.

13. 35 U.S.C. § 271 (2000).

14. *See* Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005) ("It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude,' " quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). The patent statute is consistent with this as it requires a patent to "conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." *See* 35 U.S.C. § 112 (2000).

tangible property and is also at the leading edge of human knowledge, where descriptive vocabularies are necessarily less developed.

Compounding the difficulty and complexity of claim construction is the central role it plays in the patent system. As private parties, individuals must construe claims to assess the legal risks associated with particular behaviors, as well as to make rational investment decisions. As dispute resolution institutions and enforcers of the laws and policies of the patent system, courts construe claims to make determinations of infringement and invalidity. Claims also define the invention that is examined against the requirements for patentability.[15] So as the public's agent, the patent office must construe claims in assessing patentability. Because nearly everything in a patent case turns on claim construction (e.g., whether infringement has occurred, or whether the patent meets the requirements for patentability), it is thought to be a key and dispositve issue most patent cases.[16] Thus, as Judge Giles S. Rich famously wrote, "the name of the game is the claim."[17]

Given the centrality of claim construction, it should come as little surprise that as the Federal Circuit sought to address Congress's demand that it bring coherence and stability to patent law, claim construction became the centerpiece of its reform efforts. Briefly,[18] in *Markman v. Westview Instruments*,[19] the Supreme Court affirmed the Federal Circuit's understanding that the question of patent claim construction is not subject to the 7th Amendment right to a jury trial. The Court assigned the question to judges on the rationale that they are deemed to have special skill when it comes to the interpretation of documents[20] and that the allocation of interpretive authority to judges should promote the policy goals of jurisprudential certainty and uniformity.[21] Shortly thereafter, the Federal Circuit took total control of issue, holding in *Cybor Corp. v. FAS Technologies, Inc.*, that the question of claim construction is "purely

15. *See, e.g.*, 35 U.S.C. § 101 (2000) (subject matter and utility requirements); § 102 (novelty requirement); § 103 (nonobviousness requirement).

16. *See* Markman v. Westview Instruments, Inc., 52 F.3d 967, 989 (Fed. Cir. 1995) (en banc) (Mayer, J., concurring) ("to decide what the claims mean is nearly always to decide the case").

17. Giles Sutherland Rich, *Extent of Protection and Interpretation of Claims—American Perspectives*, 21 INT'L REV. INDUS. PROP. & COPYRIGHT L. 497, 499 (1990).

18. *See* R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding?: An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105 at 1120–24 (2004) (providing a more extensive analysis).

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

20. *Id.* at 388 (in contrast to "jurors unburdened by training in exegesis").

21. *Id.* at 391.

legal," and thus subject to de novo review.[22] In view of the central role claim construction plays in the patent law, this framework of judicial interpretation of patent claims confers upon the Federal Circuit the sole authority to decide a significant fraction of patent disputes.

While the consolidation of judicial power embodied in the Federal Circuit's current claim construction doctrine has generated a variety of concerns,[23] perhaps the most persistent is the concern that the pragmatic rationale underlying the current doctrine—that it should help bring stability and predictability to patent law—is deeply flawed. Perhaps no body of scholarship reflects this more strongly than the body of scholarship associated with assessing how often the Federal Circuit reverses lower court claim construction determinations.[24] The basic thrust of the criticism is that a high reversal rate on the issue of claim construction introduces costly unpredictability[25] into the patent system.

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22. 138 F.3d 1448, 1456 (Fed. Cir. 1998) ("[W]e therefore reaffirm that, as a purely legal question, we review claim construction de novo on appeal . . . .").

23. For scholarly argument criticizing the *Cybor* decision, see William H. Burgess, *Simplicity at the Cost of Clarity: Appellate Review of Claim Construction and the Failed Promise of* Cybor, 153 U. PA. L. REV. 763, 774–90 (2004). *See also*, *e.g.*, John F. Duffy, *On Improving the Legal Process of Claim Interpretation: Administrative Alternatives*, 2 WASH. U. J.L. & POL'Y 109 (2000); Nard, *supra* note 11; Christian A. Chu, *Empirical Analysis of the Federal Circuit's Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075 (2001). For judicial criticism of *Cybor*, consider the remarks of Judge Mayer in *Phillips v. AWH Corp.*:

> This court was created for the purpose of bringing consistency to the patent field. Instead, we have taken this noble mandate, to reinvigorate the patent and introduce predictability to the field, and focused inappropriate power in this court. In our quest to elevate our importance, we have, however, disregarded our role as an appellate court; the resulting mayhem has seriously undermined the legitimacy of the process, if not the integrity of the institution.

415 F.3d 1303, 1330 (Fed. Cir. 2005) (Mayer, J., dissenting).

24. *See* David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223 (2008) (providing a measure of reversal rate); Michael Saunders, Note, *A Survey of Post-*Phillips *Claim Construction Cases*, 22 BERKELEY TECH. L.J. 215 (2007) (analyzing the effect of *Phillips*); Andrew T. Zidel, *Patent Claim Construction in Trial Courts: A Study Showing the Need for Clear Guidance From the Federal Circuit*, 33 SETON HALL L. REV. 711, 741–42 (2003) (discussing the American Bar Association's 2000 survey of claim construction timing); Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?*, 15 HARV. J.L. & TECH 1, 17–31 (2001) (also discussing the 2000 study); *see also* Kimberly A. Moore, Markman *Eight Years Later: Is Claim Construction More Predictable?*, 9 LEWIS & CLARK L. REV. 231, 243–47 (2005) (updating the prior study); Chu, *supra* note 23, at 1100–06; Gretchen Ann Bender, *Uncertainty and Unpredictability in Patent Litigation: The Time is Ripe for a Consistent Claim Construction Methodology*, 8 J. INTELL. PROP. L. 175, 207 (2001) (providing a measure of reversal rates).

25. *See, e.g.*, Schwartz, *supra* note 24, at 225–27 (describing some aspects of unpredictability); Kimberly A. Moore, Markman *Eight Years Later*, *supra* note 24, at 232 n.2 (collecting sources raising this issue). *But see, e.g.*, Jeffery A. Lefstin, *Claim Construction, Appeal, and the Predictability of Interpretive Regimes*, 61 U. MIAMI L. REV. 1033 (2007) (questioning scholarly emphasis on predictability in claim construction).

It is often useful to measure a problem, and studies of claim construction reversal rates have measured other variables to valuable affect. But with one exception, the main studies in this area concern themselves with data sets comprised of cases selected by the presence of a judicial analysis of claim construction.[26]

The study presented here departs from this model. Rather than focusing on the set of cases in which the Federal Circuit addresses claim construction, this study focuses on a set of cases defined by a different patent doctrine.[27] The basic idea is to explore the impact of claim construction on other areas of patent law.

The logic behind this study may already be apparent to the reader. If claim construction really is central to all things patent, then one can hypothesize that the development of uncertainty and unpredictability in claim construction—documented in the reversal rate studies just discussed—might infect, or bleed into, other doctrinal areas of patent law. If so, one might expect that as claim construction becomes at once more unpredictable *and* more *prominently involved* in other areas of the patent law, the court's treatment of other areas of law might, by association, also become more unpredictable.[28] The Article labels this hypothesis the *claim construction effect*.

The hypothesis of the claim construction effect can be empirically tested, and this Article's first and most significant contribution is to test the hypothesis using empirical techniques. Ultimately, it argues that the hypothesis finds support in four central pieces of evidence. First, the Article shows that the average rate at which the Federal Circuit uses claim

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26. *See, e.g.*, Schwartz, *supra* note 24, at 238 (establishing an appellate database that "includes all Federal Circuit cases in which the parties disputed the district court's construction of a claim limitation"); Kimberly A. Moore, Markman *Eight Years Later*, *supra* note 24, at 239 ("This original database now contains all precedential, non-precedential, and Rule 36 (summary affirmances) decisions of the Federal Circuit on claim construction from the Supreme Court's *Markman* decision (1996) through 2003."). The exception is the Chu study, which collected all patent cases between January 1, 1998 and April 30, 2000. *See* Chu, *supra* note 23, at 1092. But although it collects a broad swath of information, it uses the information differently than this study. Moreover, it addresses relatively small period of time in Federal Circuit history, making it difficult to discern broad patterns.

27. This study uses the doctrine of equivalents. It will be introduced in more detail, *infra*.

28. As used here, unpredictability refers to a measure of how frequently the Federal Circuit concludes that trial courts are incorrect in their understanding of the law; it does not refer to a measure of whether, as a matter of ultimate outcomes, an issue resolves itself in a non-random manner. In other words, in the context of this study, a decline in the rate at which the Federal Circuit affirms lower court judgments on an issue (e.g., the doctrine of equivalents) is evidence of destabilization even if as a matter of ultimate outcomes on the issue patentees have a high loss rate, *cf.*, Allison & Lemley, *infra* note 30 (conflating Federal Circuit and trial court data and concluding that overall there has been a decline in successful ultimate outcomes for patentees on the doctrine of equivalents).

construction in the dataset has increased over the last fifteen years. Second, the Article shows that the average rate at which the court modifies lower court claim construction determinations has increased over the last fifteen years. Third, the Article shows that as the Federal Circuit increased the rate at which it modified lower court claim construction determinations, there was a complementary decrease in the power of the court to affirm. The fourth piece of evidence, while supporting the hypothesis, also suggests an explanation. It argues that the claim construction effect is largely the product of an intracircuit dispute over the development of claim construction doctrine. The appearance of the claim construction effect associates well with the strengthening of distinctly different judicial approaches to the task of construing claims.

The second general contribution made by this article is an empirical analysis of whether the Federal Circuit corrected the *claim construction effect* with its opinion in *Phillips v. AWH Corp.*,[29] which, by attempting to clarify how claim construction should be analyzed, seeks to resolve relevant differences in judicial approaches to claim construction. Here, the results paint a decidedly mixed picture. Some predictability appears to have returned after *Phillips*, with some judges significantly changing their authorship patterns. There is evidence, though, that the fundamentals of the *claim construction effect* remain strongly entrenched in Federal Circuit jurisprudence.

The Article proceeds in four additional parts. Part II describes the study design and methodology, and includes a description of the doctrine that defines the data set—the doctrine of equivalents. Part III presents the results and provides an analysis of their meaning. Part IV offers some concluding remarks.

II. Study Design & Methodology

The overall design of this study is straightforward. It relies on a widely accepted data collection and analysis technique generally known as "content analysis"[30] to gather information from judicial

29. Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005) (en banc) (attempting to resolve the conflicting methodological approaches to claim construction highlighted in Wagner & Petherbridge, *supra* note 18, at 1148–70).

30. Content analysis refers to the systematic reading and analysis of texts, including judicial opinions. In contrast to more traditional forms of legal scholarship, it seeks a comprehensive, objective understanding of a body of law as opposed to an interpretation of symbolic or important judicial opinions. It thus permits scholars to verify, analyze, or refute empirical claims about case law that are implicit or explicit in all branches of legal scholarship. For an article describing content analysis and its application to legal studies, see Mark A. Hall & Ronald F. Wright, *Systematic Content Analysis of Judicial Opinions*, 96 Cal. L. Rev. 63 (2008). For some examples of legal scholarship that have used content analysis as an approach

opinions.[31] The basic approach is to systematically categorize (or "code") judicial opinions and to utilize the data that result to empirically analyze the jurisprudence.

The study also takes the form described in the previous part. The data set is not determined by whether a written opinion contains an analysis of claim construction. Its composition is instead determined by the presence of another patent doctrine, known as the doctrine of equivalents. Thus, only a subset of the full dataset contains a Federal Circuit claim construction determination. This framework allows for the exploration of the behavior of claim construction and other variables within a particular area of the court's law.

The doctrine of equivalents is well-suited to this study for several reasons, some of which are quite straightforward and practical. For example, the doctrine of equivalents is widely known and discussed among legal scholars[32] and is also widely applied,[33] providing an ample number of opinions to study. The doctrine of equivalents is also well-suited to this study for more conceptual reasons. Below, I introduce some of the

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to examining a body of law, *see* John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955 (2007); Petherbridge & Wagner, *supra* note 10; Cotropia, *supra* note 10; Wagner & Petherbridge, *supra* note 18; Schwartz, *supra* note 24.

31. Using judicial opinions as a dataset naturally imports a set of well-recognized biases, the most important of which affect not only content analysis, but also more traditional interpretive forms of legal scholarship. These include unobserved reasoning, selection bias, and strategic behavior. *See* Wagner & Petherbridge, *supra* note 18, at 1128–30. But while these biases should be kept in mind, they should not be overemphasized. The source of information relied upon in this sort of study—judicial opinions—is essentially the same source that is traditionally relied upon by legal scholars and patent system participants on a day-to-day or case-by-case basis. Taking a comprehensive approach to the examination of that information can provide benefits that outweigh the limitations of the approach, and can avoid some of the limitations presented by using more traditional approaches to legal scholarship.

32. Some recent legal scholarship examining this issue includes Allison & Lemley, *supra* note 30; Charles W. Adams, *The Doctrine of Equivalents: Becoming a Derelict on the Waters of Patent Law*, 84 NEB. L. REV. 1113 (2006); Doug Lichtman, *Substitutes for the Doctrine of Equivalents: A Response to Meurer and Nard*, 93 GEO. L.J. 2013 (2005); Michael J. Meurer & Craig Allen Nard, *Invention, Refinement, and Patent Claim Scope: A New Perspective on the Doctrine of Equivalents*, 93 GEO. L.J. 1947 (2005); Douglas Lichtman, *Rethinking Prosecution History Estoppel*, 71 U. CHI. L. REV. 151 (2004); R. Polk Wagner, *Reconsidering Estoppel: Patent Administration and the Failure of* Festo, 151 U. PA. L. REV. 159 (2002); S. Jay Plager, *Challenges for Intellectual Property Law in the Twenty-First Century: Indeterminacy and Other Problems*, 2001 U. ILL. L. REV. 69 (2001); Paul R. Michel, *The Role and Responsibility of Patent Attorneys in Improving the Doctrine of Equivalents*, 40 IDEA 123 (2000); Hal C. Wegner et al., *The Future of the Doctrine of Equivalents*, 26 AIPLA Q.J. 277 (1998); Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839 (1990).

33. Allison & Lemley, *supra* note 30, at 977 (stating that "a patentee is almost always arguing the doctrine of equivalents as an alternative to a theory of literal infringement"); *see infra* Part II.A (reporting that the Federal Circuit has decided 991 equivalents analyses in its written opinions in the last fifteen years).

details of the doctrine of equivalents and explain why it is could be a fairly sensitive substrate for detecting the presence *vel non* of the claim construction effect.

As noted earlier, the boundaries of a patentee's right to exclude are set by the limits defined from the words that comprise the patent claim. To give this principle legal and technical context, patent doctrine utilizes the two-step analysis set forth in the following familiar refrain: "First, the claim must be properly construed to determine its scope and meaning. Second, the claim as properly construed must be compared to the accused device or process."[34]

This approach to assessing liability for patent infringement makes the following real world scenario reasonably possible: a competitor might often be capable of both avoiding infringement liability and appropriating the substance of an invention by developing accused devices or processes that differ insubstantially in connection with even a single limitation. While patentees inevitably strive to draft claims that thwart this form of competition, the task may be quite difficult for several recognized reasons. Words present an imperfect means to describe the boundaries of patented subject matter.[35] A patentee may mistakenly fail to claim all commercially useful embodiments. Alternatively, future technological advances may make unforeseen and (therefore unclaimed) embodiments practicable.

The doctrine of equivalents exists specifically to deal with the economic consequences of the widespread realization of this scenario. In a leading case, *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*,[36] the Supreme Court set forth the policy implicated by the doctrine: to protect the incentive structure of the patent system. The court reasoned that allowing putative infringers to escape liability by practicing trivial changes would discourage potential patentees from taking the risk of innovation, as well as discourage "unscrupulous copyists" from pursuing innovations of their own.[37] Thus, the Court reasoned, to prevent "fraud on a patent,"[38] the doctrine of equivalents would be available to

34. *See, e.g.*, Carroll Touch, Inc. v. Electro Mech. Sys., Inc., 15 F.3d 1573, 1576 (Fed. Cir. 1993) (setting forth the two steps of infringement). The doctrine also prescribes this infringement inquiry take place within the context of the all elements rule. *See* Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17 (1997) (holding that the determination of equivalence in an infringement action should proceed on an element-by-element basis). Thus, each element of the claimed invention must be present literally or equivalently in the accused device.

35. *See, e.g.*, Clarisa Long, *Information Costs in Patent and Copyright*, 90 VA. L. REV. 465 (2004).

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

37. *Id.* at 607.

38. *Id.* at 608.

patentees to exclude others from subject matter beyond the literal scope of a patent.

In general terms then, the doctrine of equivalents is, as a colleague recently and succinctly put it, a "close enough" doctrine.[39] It determines whether an accused infringer's conduct, while not infringing the letter of a patent, may still be enjoined because it is "close enough" to the letter of a patent.

The doctrine of equivalents could be a sensitive substrate when it comes to detecting the impact of claim construction. The conceptual reason for this is that expanding or contracting the literal meaning of a claim can—and might often be expected to—have an impact on the scope of available equivalents. The following example helps to illustrate this point. Assume the following claim:

A means for striking comprising:
a stick,
a nail, and
a rope.

Assume next that the patent itself discloses only an iron nail, and that this narrow disclosure is used by the trial court to determine that "nail" is defined in the context of this claim as "iron nail." Barring the application of some other rule restricting the use of equivalents, an iron nail has a range of equivalents, i.e., a range of things from which it is only insubstantially different in this context (perhaps, an iron screw, or an iron tack). But if the Federal Circuit examines this determination and concludes that it was inappropriate to limit the scope of "nail" to an "iron nail," and returns the scope of the limitation to "any nail," the genus of available equivalents—things not insubstantially different from a nail—likely becomes larger. Not only might steel screws and alloy tacks be equivalents, but nonmetallic embodiments are more plausibly equivalent—e.g., wooden screws, ceramic rivets, or plastic pegs, might be included.[40] Indeed, without a metallic limitation, more general fasteners, like tape or Velcro-type fasteners, might fall within the scope of equivalents.[41] Similarly, the scope of equivalents might be expected to contract if the original literal interpretation of the claim was that a "nail" means "any fastener that affects fastening by penetration," and the Federal

39. Dan Schechter, pers. comm. (2008).

40. To be clear, I do not mean to say that it would be theoretically impossible for a court to conclude that these embodiments were not insubstantially different from an iron nail. The point is that one might, as a matter of theory, expect a shift in likelihood that these embodiments could be found to be only insubstantially different if the literal scope of the claim was adjusted from "iron nail" to "nail."

41. *Id.*

Circuit, finding error, limits the literal scope to a short metallic rod with a flat head, a smooth shaft, and a pointy end.

A. *Database Construction*

The data set used in this study includes all observable Federal Circuit analyses deciding the doctrine of equivalents over a roughly fifteen (15) year period spanning January 1, 1992 to May 2, 2007.[42] The data set was assembled from a search of the LEXIS "Federal Circuit—US Court of Appeals Cases" database. Using no date restrictions, the following terms were searched:

> *patent! and equivalent! and ("prosecution history estoppel" or "file wrapper" or "estoppel" or "all elements" or "vitiate" or "vitiation" or "dedicate" or "dedication" or "disclaim" or "disclaimed" or "disavow" or "disavowal" or "graver tank" or "hilton" or "warner-jenkinson" or "festo" or "doctrine") and not name (in re) and not "sec'y."*

The search returned 1,235 cases. The data set was then truncated to the above described date ranges, and manually screened for decisions on the doctrine of equivalents. Cases directed to the so-called "reverse doctrine of equivalents" were excluded, as well as all other cases not deciding the doctrine of equivalents.

Each observable analysis deciding the doctrine of equivalents was entered as a record in the data set. If an opinion decided the issue of infringement by equivalents of three claims, using distinct analyses for each claim, each analysis counted as a separate record in the data set. If an opinion decided the issue of infringement by equivalents for several claims from a single patent with a single analysis, *e.g.*, a single incidence of estoppel barred resort to equivalents for more than one claim, that analysis received a single entry in the data set. However, if the court decided claims from two or more different patents with a single equivalents analysis, each patent was scored as a single analysis. Multiple analyses per opinion were not uncommon. This approach yielded 991 analyses.

For this particular study, the data set was truncated even further. Only analyses that were clear with respect to claim construction status

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42. These dates have general, but not specific, significance. January 1, 1992 was selected because it provides for a large set of data records before a number of Supreme Court and Federal Circuit opinions that are conventionally seen as notable in the history of claim construction doctrine and the doctrine of equivalents. May 2, 2007 was chosen because that was the date of the most recently issued relevant opinion at the time the search for opinions was conducted, and because it provided a roughly five-year window—a relatively large number of opinions—after the most recent major Supreme Court decision concerning the doctrine of equivalents, *see* Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722 (2002).

were included. Thus, to be included, analyses had to show that claim construction had been considered and report whether the court agreed with the lower court's construction, or contain no indication that claim construction had been considered in the analysis. Opinions that were ambiguous with respect to claim construction status were excluded. Only opinions for the court (not dissents or concurrences) were included. This reduced the total number of analyses used in the study from 991 to 878.

B. *Measurement Criteria*

The measurement criteria for the Federal Circuit's doctrine of equivalents jurisprudence encompassed a broad array of variables. Variables used in this study are shown in Table 1.

TABLE 1
MEASUREMENT CRITERIA USED IN THE STUDY

Field ID	Description	Form	Coding
Serial	Serial number	[Integer]	Machine
Date	Date issued	[Date]	Machine
Author	Author of court's opinion	[Text]	Machine
Summary Judgment	Is appeal from summary judgment?	[Yes, No]	Human
Outcome 1		[Affirm, Reverse, Vacate]	Human
Discernable CC	Presence of claim construction	[Yes, No]	Human
Disposition 2	Disposition of claim construction	[CC modified, CC unmodified, N/A]	Human
PHE Amendment[43]	Presence of doctrine	[Yes, No]	Human

43. The amendment form of prosecution history estoppel seeks to prevent a patentee from recapturing through the doctrine of equivalents subject matter surrendered by the amending of patent claims during patent prosecution, *see, e.g.*, Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722 (2002) (adopting a rebuttable presumption that a narrowing amendment surrenders an equivalent), or by cancellation and rewriting of patent claims during patent prosecution, *see* Honeywell Int'l Inc. v. Hamilton Sundstrand Corp., 370 F.3d 1131 (Fed. Cir. 2004) (en banc).

Field ID	Description	Form	Coding
Equivalent Specific Totals[44]	Presence of specific doctrines associated with the doctrine of equivalents	[Grouped variable]	Human
Opinion		[Court, Concur, Dissent]	Human

III. Results & Discussion

Analysis of the collected data proceeds by first examining the rate which the Federal Circuit applies claim construction in the context of analyzing the doctrine of equivalents. Finding that there has been a significant increase in the rate at which the court applies claim construction, the analysis next examines the rate at which the Federal Circuit modifies lower courts' claim construction determinations. Because the evidence indicates that there has been a sharp increase in the rate that the Federal Circuit modifies claim construction, the analysis moves to examining the relationship between claim construction modification and the power of the court to affirm lower courts' judgments.

It finds that over the last fifteen years, there is a complementary decrease in the power of the court to affirm. The analysis characterizes the decrease in the power to affirm decisions on the doctrine of equivalents as a decline in doctrinal predictability.[45] The evidence supporting the analysis indicates that the overall decline in predictability is more strongly predicted by the modification of lower court claim interpretations than it is by doctrines conventionally understood as affecting the application of the doctrine of equivalents.

These results are interpreted as evidence supportive of the hypothesis of claim construction effect. There has been an increase in the rate that the court uses claim construction in connection with decisions on the doctrine of equivalents *and* an apparent increase in the impact of

44. This variable collects analyses positive for a number of doctrines involved in deciding the doctrine of equivalents. Specific descriptions of their characteristics are unnecessary to the analysis presented; but for those who are interested, beyond the amendment form of prosecution history estoppel, the doctrines grouped in this variable comprise: argument-based prosecution history estoppel, the "All Elements" Rule, the prohibition against a scope of equivalents that encompasses prior art, the prohibition against a scope of equivalents that encompasses subject matter disclosed but not literally claimed in a patent specification, the limitation of the doctrine of equivalents in some cases to only after arising technologies, and the two major standards for performing the equivalents comparison between an accused device and the patent, known as the "function-way-result" test and the "insubstantial differences" test.

45. Recall that doctrinal predictability here refers to a measure of how frequently the Federal Circuit concludes that a trial court is incorrect; it is not a measure of how frequently a patentee might ultimately prevail in any given case. *See supra* note 28.

claim construction decision-making on equivalents decisions. The impact takes the predicted form—a decline in doctrinal predictability.

The analysis then seeks additional support for the hypothesis of the claim construction effect by looking for potentially explanatory jurisprudential and doctrinal happenings. To find potential explanations, the analysis screens the last fifteen years of Federal Circuit jurisprudence for periods of unpredictability. It finds that an increase in unpredictability developed around the year 2000, and that it associates well with the strengthening of distinctly different judicial approaches to the task of construing claims. Together the results suggest that the claim construction effect is largely the product of an intracircuit dispute over the development of claim construction doctrine.

With this information in hand, the final Part examines whether the Federal Circuit's recent efforts to resolve the diversity in its claim construction jurisprudence[46] has diminished the *claim construction effect* and restored some measure of doctrinal predictability.

The analyses undertaken in this section rely heavily on two response variables. The first is *affirmed*. This response variable was scored as positive (a "1") when a Federal Circuit analysis affirmed a lower court's decision on the doctrine of equivalents. When an analysis did not affirm the decision of the lower court, a negative score (a "0") was awarded. The variable *affirmed* is the primary measure of unpredictability used in this study. The basic logic is that where the Federal Circuit is unable to affirm lower court decisions, it signals unpredictability in the law.

The second response variable used extensively in the analyses presented in this section is *claim construction modification*. This variable is a measure of whether a Federal Circuit analysis modified a lower court's construction of a claim limitation involved in an equivalents dispute. A positive (*i.e.*, construction modified) analysis was scored as a "1," while a negative (*i.e.*, construction not modified) analysis was scored as a "0."

The empirical evidence reported in this study comes from the application[47] of several statistical techniques. Some are simple descriptive statistical techniques, such as graphical representations, reports of percentages and reports of odds of success with respect to response variables at various points in the history of patent law. The study also employs more complex statistical arguments, including *linear regression*, the *chi square* test, which is useful for exploring whether there are relationships between certain variables, and *logistic regression*, which is a particularly good complement to *chi square* in the context of this study

46. Phillips v. AWH Corp., 376 F.3d 1382 (Fed. Cir. 2004) (attempting this).

47. The software used for the majority of statistical calculations includes SPSS and Microsoft Excel. The graphical representations are produced with Numbers.

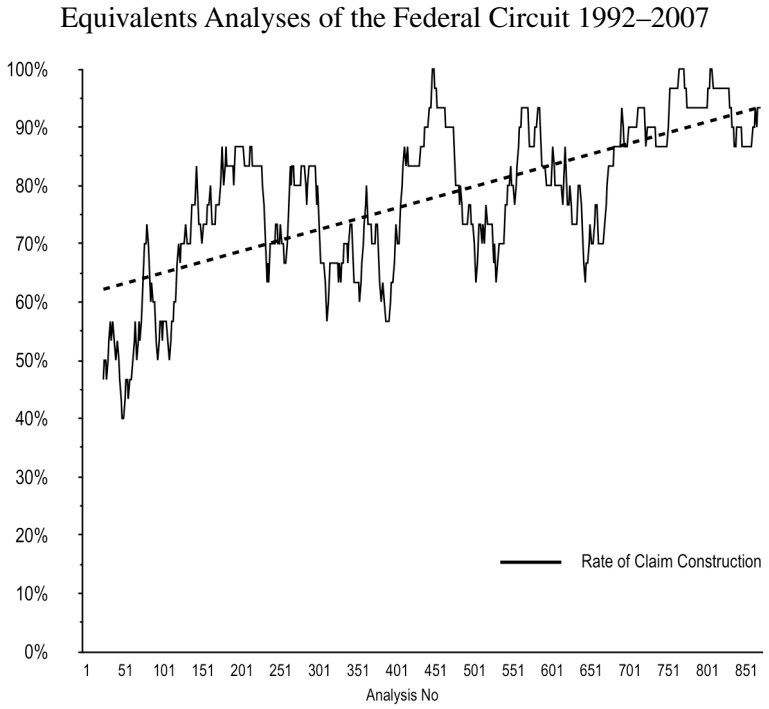
because it is highly effective at estimating not only the probability that certain variables predict (or explain) positive outcomes for response variables, but also the strength of the predictive power.

The analysis will from time to time report statistical significance. Statistical significance indicates whether the observed results are likely due to chance, and is indicated by the letter *p*, which stands for probability. Any *p-value* less than .05 is considered statistically significant because it indicates that the probability that the results are due to chance is less than 5-percent. Values less than .1 are considered marginal, indicating that the probability that the observed results are due to chance is less than 10-percent.

A. *The Claim Construction Effect*

Figure 1 shows the trend in the rate at which the Federal Circuit used claim construction in written analyses deciding the doctrine of equivalents over the last fifteen years. As is evident, there is an impressive increase in the average rate at which the Federal Circuit applies claim construction. Figure 1, therefore, provides evidence of the first pillar of the claim construction effect—an increase in the use of claim construction in Federal Circuit analyses.

FIGURE 1[48]
TREND IN RATE OF CLAIM CONSTRUCTION IN EQUIVALENTS ANALYSES



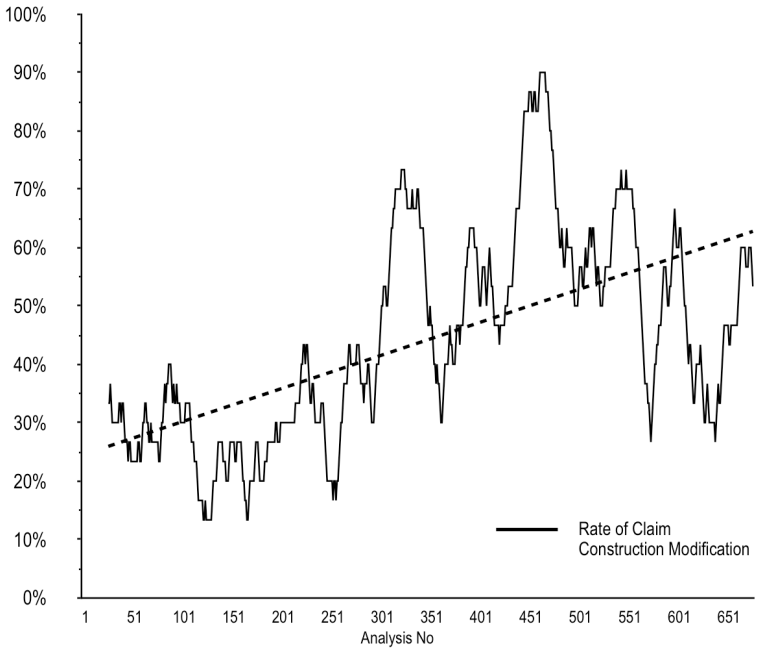
The second pillar of the claim construction effect is the proposition that accompanying the increase in the use of claim construction in the context of the doctrine of equivalents is an increase in the impact of claim construction. The putative increase in impact is wrought by an increase in the rate at which the Federal Circuit rejects lower court claim constructions.

Several pieces of evidence suggest that this is a characteristic of equivalents jurisprudence. First, Figure 2 shows than when the Federal Circuit considers lower court claim construction determinations, there is

48. The ordinate represents a 30-analysis lagged average of the percentage of successful outcomes for the response variable *claim construction* (to be successful, the analysis had to indicate that the Federal Circuit considered claim construction in connection with a claim limitation involved in an equivalents dispute), plotted against the number of analyses ($n=878$). On the abscissa, the analysis number moves from left to right (1992–2007). A moving, lagged average is used. The lagged average provides a measure of the recent average frequency over thirty analyses of any given content at any given point in the data set. It approximates what a lawyer might see if he or she were to sample the court's most recent 20–25 opinions on the topic at any point in time. The linear trend line is a least squares line, having the following statistical characteristics: r=.696, r^2=.485, $t\text{-}obs$=28.236, p=.000.

a sharp upward trend in the rate at which the Federal Circuit rejects them. Thus, Figure 2 is evidence supportive of the presence of the second pillar of the claim construction effect. The putative means through which claim construction could be affecting this area of law—rejection (or modification) of lower court claim construction—is present and increasingly frequent.

FIGURE 2[49]
TREND IN RATE OF CLAIM CONSTRUCTION MODIFICATION IN EQUIVALENTS ANALYSES THAT CONTAIN CLAIM CONSTRUCTION



But the real world impact of the Federal Circuit's rejection of claim construction determinations in this area of law is theoretical. In other words, the Federal Circuit could be modifying many lower court claim interpretations, but it might have no significant impact on the court's

49. The ordinate represents a 30-analysis lagged average of the percentage of successful outcomes for the response variable *claim construction modification*, plotted against the number of analyses containing a claim construction (*n=681*). On the abscissa, the analysis number moves from left to right (1992–2007). A moving, lagged average is used. The lagged average provides a measure of the recent-average frequency over thirty analyses of any given content at any given point in the data set. The linear trend line is a least squares line, having the following statistical characteristics: r=.597, r^2= .357, *t-obs*=18.990, p=.000.

propensity to affirm lower court determinations concerning the doctrine of equivalents. To gather evidence on whether the increase in average rate of claim construction modification translated into appellate unpredictability in the doctrine of equivalents, Figure 3 examines the trends in average rates of *claim construction modification* and *affirmed* throughout the data set. It also provides the next piece of evidence supporting the real world presence of the second pillar of the claim construction effect.

FIGURE 3[50]
TRENDS IN RATES OF AFFIRMED AND CLAIM CONSTRUCTION MODIFICATION

Equivalents Analyses of the Federal Circuit 1992–2007

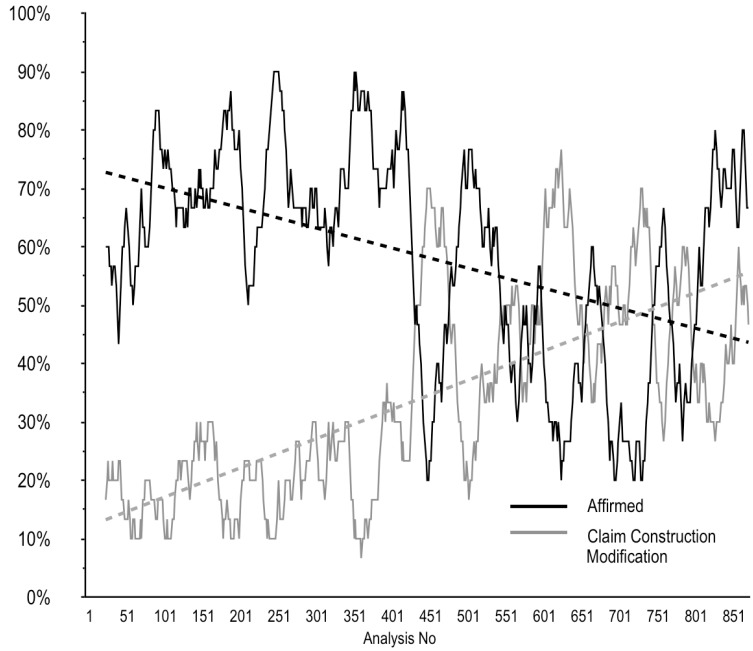


Figure 3 shows that the average rate of *affirmed* is relatively high for approximately the first half of the data set. In contrast, the average rate

50. The ordinate represents a 30-analysis lagged average of the percentage of successful outcomes for the response variables *affirmed* and *claim construction modification*, plotted against the number of analyses (n=878). On the abscissa, the analysis number moves from left to right (1992–2007). A moving, lagged average is used. The lagged average provides a measure of the recent-average frequency over thirty analyses of any given content at any given point in the data set. The linear trend lines are least squares lines, having the following statistical characteristics: Affirmed, r=.468, r^2=.219, *t-obs*=-15.426, p=.000; Claim Construction Modification, r=.708, r^2=.501, *t-obs*=29.157, p=.000.

of *claim construction modification* during the same period is relatively low. Around (roughly) analysis number 400, the average rate of *affirmed* appears to fall sharply. Simultaneously, the average rate of *claim construction modification* appears to begin a steep climb. After this apparent change in behavior, the average rates do not seem to stabilize at their earlier levels.

Notably, the rates of positive outcomes for the response variables may reflect a pattern. When rates of *affirmed* are higher, rates of *claim construction modification* appear lower.[51] When rates of *claim construction modification* are higher, rates of *affirmed* appear lower. This pattern is evidence suggesting a relationship between *affirmed* and *claim construction modification*; in particular, that the Federal Circuit's behavior toward lower court claim constructions may be responsible for the unpredictability that enters Federal Circuit equivalents jurisprudence after the year 2000.

But while the patterns suggest a relationship between *affirmed* and *claim construction modification*, its evidentiary force is somewhat modest. Focusing on the downward trend in the rate of *affirmed*, it is possible that it might be accounted for by some variable or variables other than *claim construction modification*. For example, the Federal Circuit's famous, controversial,[52] and now reversed *Festo* decision,[53] which involved the amendment form of prosecution history estoppel, falls at analysis number 382. And while there are reasons to think that the *Festo* decision should not be a significant predictor of unpredictability,[54] the results examined thus far do not rule out the possibility that the unpredictability that arises might be a consequence of the *Festo* decision or some other decision of the courts involving the doctrine of equivalents.

To gather some evidence on the strength of *claim construction modification* as an explanation for the observed decrease in predictability, logistic regression was used. Table 2 presents the results of a logistic

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51. This is apparent from a visual inspection of Figure 3.

52. *See* Allison & Lemley, *supra* note 30, at 956–57 (stating that the *Festo* case "whipped the patent bar into an unprecedented frenzy").

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

54. One major reason is that *Festo* dealt primarily with only a narrow question concerning the doctrine of equivalents: the proper application of amendment-based prosecution history estopppel. *See* Wagner, *supra* note 32, at 162 n.8 (making this point). This form of estoppel limits the range of legally permissible equivalents based on amendments to claim language made by an applicant in the course of prosecuting a patent application and is thus relevant in only a fraction of equivalents cases. Another reason is that *Festo* imposed the strictest limits to date on the application of this form of estoppel, allowing no range of equivalents for claim limitations amended for reasons of patentability. Thus, one might expect it enhance rather than disturb doctrinal stability.

regression model employing *affirmed* as a response variable and testing a number of explanatory variables.

TABLE 2[55]
CLAIM CONSTRUCTION MODIFICATION IS THE STRONGEST PREDICTOR OF A DECREASE IN THE ODDS THAT THE FEDERAL CIRCUIT AFFIRMS ON THE DOCTRINE OF EQUIVALENTS

	Wald $\chi 2$	*Exp(b)*	*% Change in Odds of* affirmed	*p*
SJ	1.981	1.298	29.8	.159
CC	13.251	2.243	124.3	.000
CC Modified	213.344	.046	-95.4	.000
Eq Sp Totals	26.231	2.680	168.0	.000
PHE Amendment	1.967	.678	-32.2	.161

Table 2 shows that *claim construction modification* (CC modified) most strongly predicts a decrease in the odds that the Federal Circuit will affirm a lower court's decision on the doctrine of equivalents. This contrasts to the more general variable *claim construction* (CC), which predicts an increase in the odds that the court will affirm (and thus, probably does not explain the decline in predictability). Notably, the amendment form of prosecution history estoppel (PHE Amendment) has no significant effect on *affirmed*, suggesting that it does not explain the decline in predictability. Grouping all equivalents-specific doctrines (Eq Sp Totals) predicts an increase in the odds of *affirmed*, suggesting that when the court authors analyses discussing these doctrines, it is on the

55. Table 2 shows a logistic regression model for the response variable *affirmed*. The explanatory variables are as follows: *SJ—summary judgment*, positive when an analysis is from an appeal of summary judgment; *CC—claim construction*, positive when an analysis contains a claim construction; *CC Modified—claim construction modification*, positive when an analysis modifies a lower court claim interpretation; *Eq Sp Totals—equivalent specific totals*, positive when an analysis discusses at least one doctrine conventionally involved in deciding the doctrine of equivalents (*see* Part II.B n.45), and *PHE Amendment*, positive when an analysis discusses the amendment form of prosecution history estoppel (the subject of numerous federal circuit decisions, and two Supreme Court decisions during the period studied, *see* 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)). *% Change in Odds* of affirmed reports the change in odds of a positive outcome for *affirmed* predicted by the explanatory variable. It is calculated by subtracting one from the exponentiated logistic regression coefficient *Exp(b)* and multiplying by 100, (i.e., (.046-1) x 100 = -95.4%). *p* reports the statistical significance of the result. *Wald* χ^2 reports a *chi square* value for the predictive effect; the higher the value, the more strongly significant the result. A constant is incorporated in the model. Overall, the model is significant: $\chi 2(5)$=370.159, p=.000, *R-Sq* (Nagelkerke)=.463.

whole more likely to affirm. Thus, it does not explain the decline in predictability. Finally, Federal Circuit analyses written in response to an appeal from summary judgment (SJ) have no significant effect, suggesting that they too do not explain the decline in predictability that has happened over the last fifteen years.

Taken together, these results support the hypothesis of the claim construction effect. The Federal Circuit is using claim construction in equivalents analyses at an increasing rate. While it is doing so, the rate at which it rejects lower courts' claim construction determinations has increased sharply. Appellate predictability has declined in a pattern consonant with the observed increase in claim construction modification. Finally, regression 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.

B. *The Revolution of 2000*

This section presents more evidence of the claim construction effect, but has an additional purpose: it also seeks to provide a jurisprudential explanation for it. In other words, it concerns itself with the question of how the claim construction effect came to be.

A word of caution: this does not claim to present the sole explanation, and it does not claim to present what is necessarily an "ultimate" explanation.[56] Rather, using an empirical foundation, this section sets forth an explanatory theory centered on proximate jurisprudential and doctrinal happenings that can explain how the claim construction effect developed.

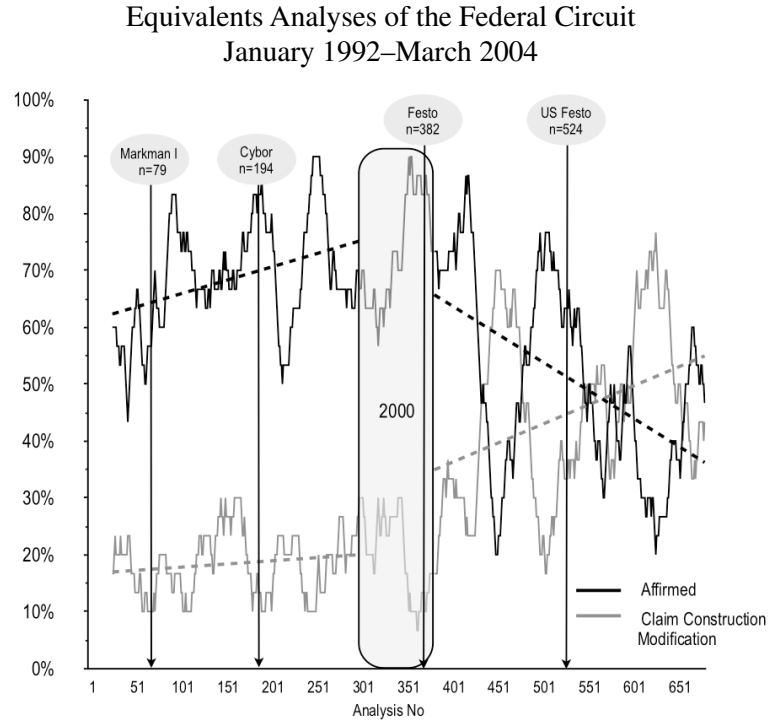
The kernel of the explanation is that the claim construction effect is predominantly the product of an intracircuit dispute over the development of claim construction doctrine as the court labored to meet the mandate set by the Supreme Court in *Markman II*. The evidence for this rather remarkable claim is set forth in more detail below and includes: an examination of the patterns in rates of *affirmed* and *claim construction modification* that support the claim that the most meaningful shifts in variable behavior occurred around the year 2000; an examination of

56. For example, I do not claim that *Markman I* and *Cybor* necessarily play no role in the *claim construction effect*. While for reasons that will soon become clear, this section emphasizes factors brought to bear on Federal Circuit jurisprudence proximal to the year 2000, it is possible (and more likely, probable) that distal factors, such as the *Markman* and *Cybor* decisions, might have cooperated in the jurisprudential changes reported in this Article.

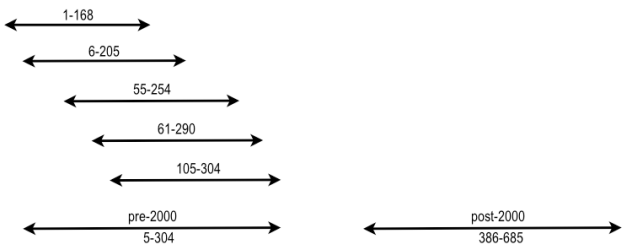
judicial behavior revealing that in the *pre-2000* period, there are no significant differences in the propensity of individual Federal Circuit judges to author opinions modifying lower court claim constructions or affirming lower court judgments, but that in the *post-2000* period significant differences emerge; and evidence that the most significant judge-dependent changes associate with judges who have been implicated in prior work as instrumental in the development of polarized methodological approaches to claim construction.

The analysis begins with an examination of the patterns in rates of *affirmed* and *claim construction modification*. Figure 4 is similar to Figure 1, but emphasizes an interpretation of the graphical data that the most apparent changes in variable behavior seem to take place around the year 2000.

FIGURE 4[57]
TRENDS IN RATES OF AFFIRMED AND CLAIM CONSTRUCTION MODIFICATION AROUND 2000



	pre-2000					post-2000			
	r^2	r	t-obs	p-slope		r^2	r	t-obs	p-slope
Affirmed	.146	.382	6.835	.000		.257	-.507	-10.157	.000
CC Modified	.025	.159	2.656	.008		.147	.383	7.160	.000



57. The ordinate represents a 30-analysis lagged average of the percentage of successful outcomes for the response variables *affirmed* and *claim construction modification*, plotted against the number of analyses (n=685). On the abscissa, the analysis number moves from left to right (1992–2004). The arrowed lines identify the span of period constructs discussed in accompanying text. The linear trend lines are least squares lines; their statistical characteristics are depicted in the figure.

The table embedded in Figure 4 provides evidence of the strength and direction of the linear relationships between the response variables *affirmed* and *claim construction modification*, and analysis number (*Analysis No*), which, while imprecise, reflects a measurement of time. The strength and direction of the linear relationships show marked differences between the *pre-2000* and *post-2000* periods. *Pre-2000*, the trend in rates of *affirmed* moves upward significantly,[58] accompanied by a positive and somewhat strong correlation with *Analysis No*.[59] At the same time, the trend in rates of *claim construction modified* is apparently flatter, although it too moves upward modestly, albeit with a weaker positive correlation to *Analysis No*.

The *post-2000* period is characterized by a marked strengthening of the linear relationships as well as by changes in their respective directions. The trend in rates of *affirmed* now moves downward sharply and significantly.[60] Instead of a positive correlation to *Analysis No*, *affirmed* now reflects a significant[61] negative correlation that is both stronger and significantly different[62] than in the *pre-2000* period. On the other hand, *post-2000*, the trend in rates for *claim construction modification* reveals a sharper upward movement, accompanied by a significant[63] positive correlation that is both stronger and significantly different[64] than in the *pre-2000* period.

This suggests the interpretation that something important likely happened in Federal Circuit jurisprudence in or around the year 2000. Before 2000, the linear relationships between *Analysis No*, and *claim construction modification* and *affirmed*, are positive. This suggests that during this period, while the court was increasingly likely to modify a lower court's construction of relevant claim language, it also experienced an increase in its ability to affirm lower court judgments on the doctrine of equivalents. The pattern is absent in the *post-2000* period. Something tipped. The linear relationships change, strengthening significantly and moving in opposite directions.

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58. With a significant, positive slope.

59. As a general rule of thumb the strength of linear relationship represented by r is as follows: r=.1, small; r=.3, medium; r=.5, large.

60. With a significant, negative slope.

61. The r to p calculations were performed with the assistance the Statistical Tables Calculator at http://faculty.vassar.edu/lowry/tabs.html#r. Here, the probability that the *post-2000* correlation coefficient is due to chance is p=.000.

62. The r to r comparisons were performed using the *Fisher r to z transformation* for two independent samples; calculated with the assistance of http://faculty.vassar.edu/lowry/rdiff.html. Here, the probability that the differences in the correlation coefficients for *affirmed* between the *pre-2000* and *post-2000* periods is due to chance is Z=-12.73, p=.000.

63. p=.000

64. Z=3.27, p=.001

Looking at the trends in rates of *affirmed* and *claim construction modification* is one way to screen for important changes in the jurisprudence over the last fifteen years. To further screen the last fifteen years for evidence of significant changes in the response variables, period constructs were developed and *chi square* testing was performed. The period constructs tested are set forth with arrows in Figure 4, and while the period constructs collectively span much of the last fifteen years, some were specifically constructed to examine events conventionally interpreted as significant to claim construction jurisprudence.

For *chi square* testing, except as described below, each period construct was divided into a symmetrical subset. For example, the *Markman I* construct examines the proportion of positive outcomes for the response variables in the 79 analyses before *Markman I* and the 79 analyses after the decision. In another example, the period construct *6–205* examines the proportion of positive outcomes for the response variables between analyses *6–105* and analyses *106–205*. The other period constructs were similarly tested, except for the constructs labeled *pre-2000* and *post-2000*. Response variable outcomes were compared between these constructs, which, as noted earlier, encompass the 300 analyses preceding the year 2000, and the 300 analyses following the year 2000.

Table 3 summarizes the results from the screening of the last fifteen years of Federal Circuit equivalents analyses for differences in *claim construction modification* and *affirmed*. It shows that around the Federal Circuit's *Markman I* decision—in which the Federal Circuit established that claim construction was a question for the judge—there are no significant differences in the likelihood that a Federal Circuit analysis either modifies a lower court claim construction, or affirms a lower court judgment concerning the doctrine of equivalents.[65] Indeed, the most marked change around the time of *Markman I* is that after the decision, the Federal Circuit affirmed lower court judgments at a somewhat higher rate than before.

65. *See* Table 3 (row presenting *Markman I* construction).

TABLE 3[66]
LIKELIHOOD OF DIFFERENCES IN POSITIVE OUTCOMES FOR RESPONSE VARIABLES DURING DIFFERENT PERIODS

		CC Mod	%CC Mod	Sig.	Affirmed	%Affirmed	Sig.
Markman I *n*=1–168	pre-79 post-79	14 16	17.7 20.3	$\chi^2(1)$=.165, *p*=.685	48 57	60.8 72.2	$\chi^2(1)$=2.300, *p*=.129
n=6–205	pre-100 post-100	15 20	15 20	$\chi^2(1)$=.886, *p*=.352	65 72	65 72	$\chi^2(1)$=1.135, *p*=.287
n=55–254	pre-100 post-100	21 14	21 14	$\chi^2(1)$=1.697, *p*=.193	68 74	68 74	$\chi^2(1)$=.874, *p*=.350
Cybor *n*=91–290	pre-100 post-100	20 18	20 18	$\chi^2(1)$=.130, *p*=.718	72 71	72 71	$\chi^2(1)$=.025, *p*=.876
n=105–304	pre-100 post-100	22 20	22 20	$\chi^2(1)$=.121, *p*=.728	68 72	68 72	$\chi^2(1)$=.381, *p*=.587
pre-2000 *post-2000*	pre-300 post-300	57 140	19 46.7	$\chi^2(1)$=52.064, *p*=.000	205 147	68.3 49	$\chi^2(1)$=23.121, *p*=.000

There is not evidence of significant differences that depend on events around the time of the Federal Circuit's *Cybor* decision, which established that claim construction is reviewed by the Federal Circuit without deference to the lower court. This is shown first by the *Cybor* period construct (*91–290*), and is supported by evidence from construct *105–304*, which examines dependence on a period falling fifteen analyses after *Cybor*.

Thus, by these measurements, there is no evidence that events around the time of *Markman I*, or around the time of *Cybor*, have a significant effect on the response variables. In sharp contrast to these results, however, there are strongly significant differences that seem to depend on events, around the year 2000. Comparing *pre-2000* analyses to *post-2000* analyses, there is a very significant increase in the Federal Circuit's production of writings modifying lower court claim constructions, and a very significant decrease in the likelihood that the court's written decisions affirm lower court judgments.

Appreciating that changes in the behavior of *affirmed* and *claim construction modification* depend on events happening in or around the year 2000 suggests that an explanation for the claim construction effect may be found by examining more closely happenings occurring in or around that time. To develop further evidence concerning the year 2000, Table 4

66. Table 3 summarizes the results from the screening of the last fifteen years of Federal Circuit analyses for differences in *claim construction modification* and *affirmed*. The count of positive outcomes for each response variable by period is reported, as is the percentage of positive outcomes. *Chi square* ($\chi 2$) values and *p-values* are also reported.

examines potential explanatory variables in two distinct ways. First, using chi square, it examines subsets of analyses defined by particular explanatory variables, asking whether outcomes for the response variable *affirmed* depend on the year 2000 in that subset. Second, using logistic regression, it queries the strength and direction of the impact of the various explanatory variables on the response variable *affirmed* in the *pre-2000* and *post-2000* periods.

The explanatory variables: *Claim construction* (CC) is a variable that includes analyses if they are positive for claim construction.[67] *No construction* is a variable positive if the court did not expressly consider claim construction. *Claim construction modified* (CC Modified) is, as before, positive when the Federal Circuit modifies a lower court's construction of a claim limitation involved in an equivalents dispute. *Construction unmodified* (CC Unmodified) is a variable positive if the court considered the issue of the correct construction of a claim limitation involved in an equivalents dispute, but did not modify the lower court's construction. *PHE Amendment* is, as before, positive if the court addressed the *Festo* issue.[68] Finally, *summary judgment* (SJ) is, as before, positive if the court authored an analysis in response to an appeal from summary judgment.

67. See *supra* note 48 (describing "successful" outcomes).
68. See *supra* Part II.C and note 43 (describing PHE Amendment).

TABLE 4[69]
CLAIM CONSTRUCTION STATUS PREDICTS
DOCTRINAL UNPREDICTABILITY

		Affirmed	Not Affirmed	% Affirmed	% Change in Odds	Wald χ^2	R Sq
CC	pre-2000	139	67	67.5	-12	.223	.001
	post-2000	106	137	43.6***	-69.8***	13.389	.066
CC Modified	pre-2000	18	39	31.6	-86.2***	37.511	.180
	post-2000	19	121	13.6**	-96.1***	104.867	.510
CC Unmodified	pre-2000	121	28	81.2	244.7***	21.626	.104
	post-2000	87	16	84.5	1141.6***	64.773	.328
No Construction	pre-2000	66	28	70.9	13.6	.223	.001
	post-2000	41	16	71.9	239.1*	13.892	.066
PHE Amendment	pre-2000	15	6	71.4	17.1	.100	0
	post-2000	27	14	65.9	123.4*	5.210	.024
SJ	pre-2000	108	40	73.0	53.1†	2.890	.014
	post-2000	118	110	51.8***	59.1†	2.860	.013

Table 4 shows that claim construction status is a very strong predictor of doctrinal unpredictability, while *PHE Amendment* and *summary judgment* are not. Before 2000, *claim construction* predicts no significant effect on the odds of a positive outcome for *affirmed*. The *R Sq* value of .001 is further evidence of a negligible relationship between the variables. After 2000, however, things change dramatically. In the *post-2000* period, *claim construction* predicts a strongly significant decrease in the odds that the Federal Circuit will affirm and the strength of association measure is 66-times that of the *pre-2000* period. By contrast, the likelihood that the Federal Circuit affirms in analyses addressing the amendment form of prosecution history estoppel does not significantly change between periods. Moreover, in the *pre-2000* period *PHE Amendment* has no significant impact on the odds that the Federal Circuit will affirm, while in the *post-2000* period, *PHE Amendment* predicts a marginally significant increase in the odds that the Federal Circuit

69. Table 4 reports, in subsets of analyses defined by the explanatory variables listed on the left, the count of analyses affirming and not affirming a lower court decision on equivalents. The significance of the difference between the two periods (by *chi square*) is depicted by the absence (not significant) or presence of a superscript on the percent reported for the *post-2000* period. Throughout, the superscripts and corresponding probabilities (*p values*) are: †≤0.1, *≤0.05, **≤0.01, ***≤0.001. Logistic regression reports the comparative predictive power of the explanatory variables between the periods. *% Change in Odds* refers to the change in odds of a positive outcome for *affirmed*, predicted by the explanatory variable; *Wald* χ^2 reports a *chi square* value for the predictive effect; the higher the value, the more strongly significant the result. *R sq* refers to *Nagelkerke's* R^2, a pseudo R^2 measurement that seeks to measure strength of association between explanatory and response variables. Between 0 and 1, larger values reflect stronger associations.

will affirm. Thus, *PHE Amendment* predicts an *increase* in doctrinal predictability in the later period, making it unlikely that the *Festo* issue explains the doctrinal instability observed *post-2000*.

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.[70] As Table 4 makes clear, the likelihood of the Federal Circuit affirming in analyses addressing appeals from summary judgment significantly decreases between periods. But *summary judgment* has a relatively weak relationship to doctrinal predictability. Not only is its predictive power marginal in terms of significance, the strength of the relationship is relatively weak—especially when compared to claim construction status. Moreover, in each period, what effect there is predicts an *increase* in doctrinal stability.[71]

Beyond showing that claim construction status is the dominant predictor of doctrinal instability, Table 4 also provides a view of how claim construction works to this effect. First, *post-2000*, the relationship between *claim construction* and whether the court will affirm becomes much stronger,[72] confirming the idea that Federal Circuit analyses have become more penetrated by claim construction. In addition, *claim construction modification*, *construction unmodified*, and *no construction* are all much more significant predictors of whether the court will affirm in the *post-2000* period than in the *pre-2000* period;[73] each variable predicts a greater change in the odds in the later period;[74] and each variable has a much stronger relationship with *affirmed* in the later period.[75]

Second, and perhaps more importantly, Table 4 provides strong evidence that the observed appellate unpredictability is a product of an increase in the influence of analyses that modify lower court claim con-

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70. For example, one might expect the *Markman/Cybor* framework to encourage trial courts to grant summary judgments. *See* 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) (observing that the *Markman* decisions could encourage summary proceedings). The corresponding impact on the population of appeals might then be expected to be an increase in the rate of appeals from summary judgment. That incentive structure may suppress the quality of judgments underlying appeals, and by extension it might suppress the ability of the Federal Circuit to affirm. *Accord* Allison & Lemley, *supra* note 30.

71. This observation comports well with the findings of Allison & Lemley, *supra* note 30 (interpreting that procedural status encourages judgments of noninfringement on the question of equivalents).

72. *Compare R Sq* .001 *with R Sq* .066.

73. For example, compare the *Wald* χ^2 values for *claim construction unmodified*: 21.626 in the *pre-2000* period to 64.773 in the *post-2000* period.

74. For example, compare the change in odds for *claim construction unmodified*: 244.7 in the *pre-2000* period to 1141.6 in the *post-2000* period.

75. For example, compare the *R sq* for *claim construction unmodified*: .104 in the *pre-2000* period to .328 in the *post-2000* period.

structions. While all claim construction status variables are much stronger predictors of doctrinal predictability in the *post-2000* period, only *claim construction modified*, which measures the propensity of the court to affirm analyses containing a modification of a lower court claim construction, shows a significant change: a decrease from 31.6- to 13.6-percent between the periods.

It thus appears something did happen in or around the year 2000 and that whatever the something is, it involved claim construction. This conclusion supports the hypothesis of the claim construction effect, and presents a level of explanation for it. But the conclusion that something significant happened in the realm of claim construction is rather pregnant with the more specific question: *What did happen?*

The evidence to this point suggests that whatever it is, it more strongly involves changes in claim construction jurisprudence than it does changes in the rules of the doctrine of equivalents. But conventional wisdom holds that there were no major claim construction opinions in the year 2000. So what else might provide an explanation for the claim construction effect? It turns out that the answer is *judges*. The analysis that follows argues that the claim construction effect can be explained as the product of an intracircuit dispute that emerged in the year 2000—a dispute over how best to develop claim construction doctrine to meet the mandate of providing a more predictable and stable patent law.

To develop evidence concerning judicial behavior between the periods, chi square testing was used to examine whether Federal Circuit judges differed from one another in the likelihood that they would author an opinion for the court that either modifies a lower court claim construction, or affirms a lower court judgment. Groups of judges were examined in the *pre-2000* and *post-2000* periods. For the *pre-2000* period the following hypotheses were tested:

> Hypothesis 1: There is no difference in the likelihood that individual Federal Circuit judges[76] author analyses modifying a lower court claim construction in the *pre-2000* period. Fail to Reject, $\chi 2(12)=8.787$, $p=.721$.
>
> Hypothesis 2: There is no difference in the likelihood that individual Federal Circuit judges[77] author analyses affirming in the *pre-2000* period. Fail to Reject, $\chi 2(12)=15.435$, $p=.218$.

76. The judges included are: Archer, Bryson, Clevenger, Gajarsa, Lourie, Michel, Newman, Nies, *per curiam*, Plager, Rader, Rich, Schall.

77. *Id.*

The failure to reject either of these hypotheses is good evidence that there are no significant differences in the authorship of these outcomes between Federal Circuit judges in the 300 analyses of the *pre-2000* period. In other words, any differences in the likelihood that one Federal Circuit judge would author an opinion modifying a lower court claim construction, or author an opinion affirming a lower court judgment, could not be distinguished from differences that might arise between judges by chance.

All that changes, however, in the *post-2000* analyses:

> Hypothesis 3: There is no difference in the likelihood that individual Federal Circuit judges[78] author analyses modifying a lower court claim construction in the *post-2000* period. Reject, $\chi 2(11)=26.438$, p=.009.

> Hypothesis 4: There is no difference in the likelihood that individual Federal Circuit judges[79] author analyses affirming in the *post-2000* period. Reject,[80] $\chi 2(11)=18.698$, p=.067.

These hypotheses provide evidence that there are significant differences between Federal Circuit judges when it comes to both response variables in the 300 analyses of the *post-2000* period. Thus, this testing provides an important piece of information. It shows that before the year 2000, the judges of the court were not significantly distinguishable in their propensity to modify lower court claim constructions, or in their propensity to affirm lower court judgments. After 2000, however, not only did the court as a whole change significantly,[81] the behavior of individual judges—as measured by their propensity to author claim construction modifications or to affirm—also changed significantly. Some judges became more or less likely to modify lower court claim constructions than other judges, and/or more or less likely to affirm.

Why did judges start to behave nonrandomly around the year 2000? As noted earlier, conventional wisdom holds that there are no major claim construction opinions in that year. Prior work has, however, established that starting around 2000, analyses at the Federal Circuit begin to show polarization between two competing methodological approaches to

78. The judges included are: Bryson, Clevenger, Gajarsa, Linn, Lourie, Michel, Newman, *per curiam*, Rader, Schall, Dyk, Prost.

79. *Id.*

80. Note that this outcome is marginal (between p=.05 and p=.1) and represents a 6.7-percent probability that the observed differences are due to chance, *see* the explanation of significance, *supra*.

81. *See* Fig. 4, Tables 3, 4.

analyzing claim construction.[82] One form of methodology reflected a "procedural" approach to the analysis of the meaning of patent claims that emphasized giving primary weight to what claim language would objectively mean to a person of ordinary skill in the relevant art. The approach was relatively singular in this goal, emphasizing a reproducible framework for assessing meanings provided in the patent disclosure, art-specific technical literature, dictionaries, and other relevant publicly available sources.[83] It tended to permit movement from the meaning that claim language held for the ordinary artisan only in clearly prescribed sets of circumstances. Judges associated with the procedural approach have come to be known as *proceduralists*.[84] They include Judges Linn and Dyk, both appointed in 2000, and Judge Clevenger (appointed 1990).

The other form of methodology emphasized what is in essence an opposite approach. It deemphasized the use of claim language and its objective meaning to those of ordinary skill in the art in favor of a more "holistic" interpretation of the patent generally, placing varying and unpredictable emphasis on one or another form of interpretive aid (e.g., sometimes claim language, sometimes disclosure, sometimes prosecution history, and sometimes dictionaries), depending on the moment. Judges associated with the holistic approach to claim construction have come to be known as *holistics*.[85] They include Judges Newman (appointed 1984), Lourie (appointed 1990), and Bryson (appointed 1994).

These approaches are not fully conceptually compatible.[86] The proceduralist approach holds that there should be a "right way" to analyze claim construction, emphasizing consistency and predictability in analytical approach as a prescriptive for the better health of the patent system.[87] The holistic approach, however, is markedly less strict in the

82. *See* Wagner & Petherbridge, *supra* note 18 (empirically demonstrating this phenomenon); Christopher A. Cotropia, *Patent Claim Interpretation Methodologies and Their Claim Scope Paradigms*, 47 WM. & MARY L. REV. 49 (2005) (arguing that distinct interpretive methodologies existed around this period); *see also* Craig Allen Nard, *A Theory of Claim Interpretation*, 14 HARV. J.L. & TECH. 1, 4 (2000) (contending that two approaches to claim interpretation exist at the Federal Circuit, "hypertextualism and pragmatic textualism").

83. Wagner & Petherbridge, *supra* note 18, at 1138 (providing examples).

84. *Id.* at 1112, 1152–55.

85. *Id.* A third set of judges have been identified as not being particularly strong adherents to either of the two competing forms of methodology; they have come to be known as *swing* judges. *Id.* at 1159–60. They include Judges Rader, Michel, Mayer, Gajarsa, Archer, Plager, Schall, Rich.

86. For an argument that the different methodologies implement distinct policies about the function of claiming and the economic role of patents, *see* Cotropia, *supra* note 82.

87. This is only a description of its normative goal; I do not mean to argue here that it necessarily is more consistent and predictable in application. Whether it is or not it is more consistent and predictable is hotly disputed and will be resolved, if at all, only after future work.

sense that it requires no consistency in analytical approach. Claim construction is intentionally viewed as more of a standards-associated black box and there is no predictable, or consistent, or "right way" to go about it. Holisticism, therefore, is less constraining for judges. It allows considerably more liberty in crafting justifications for judgments and tolerates a greater degree of judicial technological discretion than does the proceduralist approach. In turn, judges who adopt the holistic approach should find it much easier to satisfy their normative appetites about patent cases (and patents), albeit, perhaps, at the expense of some substantive consistency and predictability.

Thus, while the holistic approach to claim construction largely tolerates the proceduralist approach—because it represents just another way of doing claim construction, the proceduralist approach is much less tolerant of the holistic approach—because it makes permissible analytical moves that proceduralism on grounds of efficiency and fairness does not condone. Indeed, some evidence suggests these approaches can be incompatible enough to lead to different claim construction outcomes.[88]

Table 5 confirms that the differences between judges that arise in equivalents analyses *post-2000* involve judges associated with the different methodological approaches to claim construction that dominate the era.

88. Conflicts in outcomes based on form of methodology were found to be present in panel disagreements on claim construction, Wagner & Petherbridge, *supra* note 18, at 1144–45, and conflicts in outcomes based on form of methodology were found to be present in trial court-appellate court disagreements, *id.*

TABLE 5[89]
METHODOLOGICAL ASSOCIATION AFFECTS CLAIM CONSTRUCTION MODIFICATION AND AFFIRMED

	Analyses with Claim Construction Modification		**Analyses Affirmed**	
	Positive	*Negative*	*Positive*	*Negative*
Proceduralists	49 (58.3%)	35	32 (38.1%)	52
Swings	45 (50.6%)	44	42 (47.2%)	47
Holistics	42 (40.4%)	62	57 (54.8%)	47
Chi square	$\chi 2$ (2)=6.102, p=.047		$\chi 2$ (2)=5.207, p=.074	

Prior work also suggests that the relative strengthening of both proceduralism and holisticism starting in 2000 may be explained by the arrival at that time of Judges Linn and Dyk. As new, strong, and very active proceduralists,[90] Judges Linn and Dyk may have encouraged a struggle for supremacy over claim construction methodology with holistic judges that, due to inherent doctrinal incompatibility, escalated the extremism of both forms of analyses.[91]

To better understand whether the arrival of Judges Linn and Dyk in 2000 can explain the claim construction effect, Table 6 presents logistic regression models for authorship of opinions for the court by individual judges in the 300 analyses *post-2000*. By looking at *authorship* of opinions for the court, Table 6 provides a perspective on how individual judges through their writings "filled up" the court's written body of law during this period. The basic logic is that if, by comparison to other judges, a judge strongly associates with the response variables and strongly predicts both positive outcomes for *claim construction modification* and negative outcomes *affirmed*, then the judge is more likely to be influential in the claim construction effect. A judge's impact is likely

89. Table 5 presents a table counting positive outcomes for the response variables *claim construction modification* and *affirmed* in the 300 analyses *post-2000*. Authorship of analyses for the court by members of methodological groups serves as the explanatory variable. The results of chi square testing are reported. Similar tables testing for differences in the *pre-2000* period found no evidence of significant differences between the groups.

90. *See* Wagner & Petherbridge, *supra* note 18, at 1152–54.

91. *Id.* at 1154–56. Prior work offers an additional complementary explanation: the emerging extremism was a byproduct of the court's more general efforts to fulfill the requirements of *Markman II*, which encouraged it to develop clearer claim construction guidelines. *Id.*

felt not only through the judge's own writings, but also through the writings' influence on other judges, i.e., through stare decisis.

In Table 6, the superscripts associated with the judges report either that they are new ("n") to the court after January 1, 2000, or report that their authorship behavior changed between *pre-2000* and *post-2000*. An "a" reports a significant increase in the likelihood that the judge would author an opinion modifying a lower court claim construction. A "b" reports a significant decrease in the likelihood that the judge would author an opinion affirming a lower court judgment.

TABLE 6[92]
LOGISTIC REGRESSION MODELS FOR FEDERAL CIRCUIT JUDGES POST-2000

	% Change in Odds of CC Modified	*p*	*R Sq*	% Change in Odds of Affirmed	*p*	*R Sq*
Linn[n]	142.5	.019	.026	-42.2	.139	.010
Dyk[n]	140.6	.088	.014	-72.2	.027	.026
Schall[a,b]	118.9	.133	.011	-58.6	.106	.013
Gajarsa	78.1	.221	.007	29.4	.579	.001
Michel[a]	50.2	.432	.003	-39.1	.349	.004
Bryson[a,b]	0.5	.986	0	-7.8	.820	0
Rader	-5.1	.906	0	-29.8	.432	.003
Clevenger[a]	-6.5	.859	0	-2.7	.943	0
Lourie[a]	-34.8	.197	.008	88.2	.057	.016
Prost[n]	-43.8	.421	.003	31.2	.600	.001
Newman	-62.3	.046	.020	14.7	.741	0

The results presented in Table 6 are sorted in descending order based on the ability of a judge's authorship for the court to predict changes in the odds of *claim construction modification*. Consistent with the theory that they played an important role in the claim construction effect, Judges Linn and Dyk predict the greatest increase in the odds that an

92. Table 6 shows logistic regression models for Federal Circuit judges as authors of opinions for the court in the 300 analyses *post-2000*. Superscripts summarize the results of statistical testing assessing whether judges significantly (defined to $p<.1$) changed the rate at which they authored analyses containing a claim construction modification ("a") or affirming ("b") between *pre-2000* and *post-2000*. All significant changes for *claim construction modified* (*CC Modified*) were increases. All significant changes for *affirmed* were decreases. A superscript ("n") is used with Judges Linn, Dyk, and Prost, as they are new to the court after January 1, 2000. *p* refers to the level of statistical significance. *R sq* refers to *Nagelkerke's* R^2, a pseudo R^2 measurement that seeks to measure strength of association between explanatory and response variables. Between 0 and 1, larger values reflect stronger association.

analysis will modify a lower court claim construction. They are also the strongest predictors as measured by strength of significance and strength of association with the response variable. Table 6 also shows—generally—that the propensity of a judge to modify a lower court claim construction aligns fairly well (and inversely) with the propensity of the judge to affirm a lower court judgment. Moreover, consistent with the idea that the proceduralist approach is markedly less forgiving than the holistic, Judges Linn and Dyk are among the strongest predictors of a decrease in the odds of affirming, while the holistics are either no different than the rest of court generally (Judges Newman and Bryson), or predict a significant increase in the odds of affirming (Judge Lourie).

Accordingly, Table 6 supports an interpretation that Judges Linn and Dyk are instrumental in the claim construction effect. Taking into account prior work concerning contemporaneous changes in claim construction methodology allows for the additional interpretation that a likely explanation for the claim construction effect is that it is the product of an intracircuit dispute over whether a uniform claim construction methodology should be imposed on patent jurisprudence.[93] The logical mechanism is that structural considerations in combination with the addition of new strongly proceduralist judges and incompatibilities inherent in the two approaches created a substantial intracircuit conflict.

As Judges Linn and Dyk authored opinions emphasizing proceduralism, structural considerations—namely that under Federal Circuit law, the published opinions of earlier panels are binding precedent for later panels—should have impressed the law of the approach on the Federal Circuit. But, even as these precedents were populating the federal reporter, other Federal Circuit judges were resisting this trend by writing claim construction analyses emphasizing the holistic approach. The

93. Table 6 is not inconsistent with the idea that there was a new claim construction "superprecedent" in or around 2000, but as noted earlier, conventional wisdom admits to no such precedent.

Nor is Table 6 inconsistent with the idea that the *proceduralist* approach—that Judges Linn and Dyk (and to a lesser extent Judge Clevenger) are associated with—is more unpredictable and uncertain than the *holistic* approach (Judges Lourie, Newman, and Bryson). But while it is not inconsistent with the idea, the better view of Table 6—in the context of this study—is that it does not provide enough information to really answer this question. The differences in claim construction modification and outcome predictability seen with Judges Linn and Dyk may stem from the fact that their writings were promoting a change—indeed, attempting to impose order on a diversity of judicial approaches—which, in the face of jurisprudential resistance from some of their colleagues, left them in a position of frequently playing judicial whack-a-mole. In addition, Judge Clevenger, a proceduralist, is no different from the rest of the court generally on the response variables, suggesting that proceduralism need not produce claim construction modification or outcome unpredictability. Meanwhile, Judge Bryson, a holistic, is no different from the rest of the court generally for both response variables, and Judge Newman is no different when it comes to outcome predictability, suggesting that holisticism is not a guarantee of doctrinal stability.

same structural mechanisms that impressed proceduralism also impressed holisticism.

Without judicial agreement on an approach, diversity in Federal Circuit jurisprudence is somewhat hard to cull,[94] a situation likely exacerbated in the case of claim construction because of the incompatibility of the approaches. Here, the analytical levity of holisticism must have seemed an anathema to the consistency and structural rigor of proceduralism. Thus, the holistics' resistance to proceduralism may have had a feedback effect[95] on Judges Linn and Dyk, and to some extent Judge Clevenger,[96] who may have felt compelled to further emphasize proceduralism for its own sake (or for the sake of stare decisis). The same was likely true for holistic judges. The analytical constraints imposed by proceduralism may well have been seen as too rigid, or, perhaps, as occasionally leading to uncomfortable outcomes. Accordingly, proceduralists' resistance to holisticism may have spurred holistic judges to be even more aggressive in emphasizing the holistic approach.[97]

As the competing approaches became more entrenched, the law likely became more confused for judges who were outside the methodological groups. Some evidence that this may have happened is reflected in the fact that, while Judges Linn and Dyk lead the way, nearly all judges increase the authorship of claim construction modifications, and decrease their authorship of affirms to some extent. The more prominent examples of this phenomenon include some of the swing judges: Judge Gajarsa shows an increased his rate of authorship of claim construction modifications from 22.2-percent to 60.0-percent between the periods;[98] Judge Michel shows a significant increase in the rate of authorship of claim construction modifications; and Judge Schall shows a significant increase his rate of authorship of claim construction modifications and a significant decrease in his rate of authorship of affirms—becoming a comparatively strong predictor of both variables *post-2000*.

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94. Normally, it would require an *en banc* proceeding, Supreme Court action, or Congressional action.

95. Including the fact that as the issue became more visibly contentious, parties likely featured claim construction more often in appeals.

96. Note that Judge Clevenger significantly increases the rate at which he authors claim construction modifications between the periods.

97. Note that Judges Lourie and Bryson significantly increase the rates at which they author claim construction modifications. Judge Bryson also shows a significantly decrease in the rate at which he authors affirms.

98. Perhaps due to a relatively small sample size in *pre-2000*, the likelihood that Judge Gajarsa's authorship pattern differs between the periods is p=.109.

C. *Did* Phillips *Correct the Claim Construction Effect?*

The proceduralist/holistic methodological split did not go unnoticed by the Federal Circuit, which attempted to reunify the diverging threads of its claim construction case law though the vehicle of *Phillips v. AWH Corp.*[99] The *en banc Phillips* opinion, by its own terms, is an effort by the Federal Circuit to "clarif[y]" its jurisprudence with respect to claim construction methodologies.[100]

Although the *Phillips* majority clearly declares the holistic methodology to be the winner, it does not declare the proceduralist methodology overruled or otherwise in error. Instead, the opinion emphasizes the "anything goes" aspect of the holistic approach:

> [T]here is no magic formula or catechism for conducting claim construction. Nor is the court barred from considering any particular sources or required to analyze sources in any specific sequence, as long as those sources are not used to contradict claim meaning that is unambiguous in light of the intrinsic evidence . . . . The sequence of steps used by the judge in consulting various sources is not important; what matters is for the court to attach the appropriate weight to be assigned to those sources in light of the statutes and policies that inform patent law. In [prior case law], we did not attempt to provide a rigid algorithm for claim construction, but simply attempted to explain why, in general, certain types of evidence are more valuable than others.[101]

The court has since attempted to police statements of law that might encourage the belief that the proceduralism is the only acceptable approach. In connection with *Microprocessor Enhancement Corp. v. Texas Instruments Inc.*,[102] the court issued the following amendment to its opinion[103] in the case:

After the word *Id.* at line 14, strike:

> Phillips teaches that these sources should be accorded relative weights in the order listed, with the words of the claims themselves being the most relevant. *Id.* at 1314–19. Accordingly, we

99. Phillips v AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005) (en banc).
100. *Id.* at 1312.
101. *Id.* at 1324.
102. Microprocessor Enhancement Corp. v. Texas Instruments Inc., 520 F.3d 1367, 1378 (Fed. Cir. 2008).
103. Appeal No. 07-1249 (April 16, 2008) (correcting the original opinion decided April 1, 2008). *See also Microprocessor Enhancement Corp.*, 520 F.3d at 1378.

> discuss each source of meaning of the claim term . . . in this order.

And replace with:

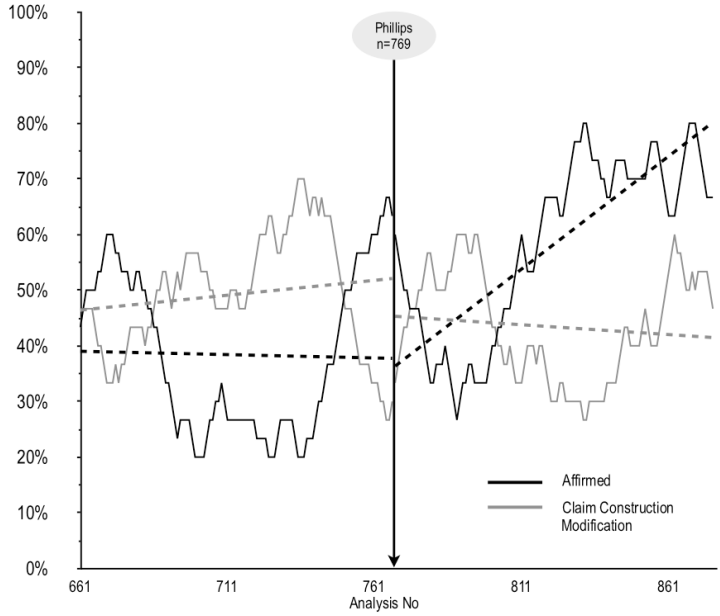
> Phillips teaches that these sources should be accorded relative weights depending on the circumstances of the case, with intrinsic sources being the most relevant. *Id.* at 1314–19. Accordingly, we discuss each source of meaning of the claim term . . . granting each source the required relative weight.

By resolving the proceduralist/holistic split in favor of holisticism, the *Phillips* opinion provides an excellent opportunity to assess whether the election of holisticism corrected the claim construction effect. The following analysis thus embodies the second general contribution of this study—an empirical assessment of whether the *Phillips* opinion corrected the claim construction effect. As discussed in more detail below, the results paint a decidedly mixed, and admittedly incomplete, picture. Some stability appears to have returned to the doctrine of equivalents after *Phillips*. But there is also evidence that the fundamentals of the claim construction effect remain strongly entrenched in Federal Circuit jurisprudence, suggesting that the court may not yet be out of the woods.

The analysis begins by considering the rates of positive outcomes for *claim construction modification* and *affirmed* in a symmetrical subset of analyses centered on the *Phillips* opinion. Figure 5 shows the average rates and trends in rates, and statistical arguments for the linear relationships.

FIGURE 5[104]
TRENDS IN RATES OF AFFIRMED AND
CLAIM CONSTRUCTION MODIFICATION

Equivalents Analyses of the Federal Circuit
January 20, 2004–May 2, 2007



	pre-Phillips				*post-Phillips*			
	r^2	*r*	*t-obs*	*p-slope*	r^2	*r*	*t-obs*	*p-slope*
Affirmed	.000	.007	-0.067	.946	.664	.815	14.553	.000
CC Modified	.019	.139	1.454	.149	.015	-.121	-1.256	.212

Figure 5 shows that in the *pre-Phillips* period, the average rate of positive outcomes for *affirmed* is roughly 40-percent, while the slope of the trend in rates of *affirmed* is not significant. After the Phillips opinion issues, however, the trend in rates moves upward significantly,[105]—reaching 80-percent—and is accompanied by a positive and quite strong correlation with *Analysis No*.[106]

By contrast, the average rate of *claim construction modification* fluctuates between roughly 40- and 50-percent both before and after the

104. As in Figure 1, the ordinate represented a 30-analysis lagged average of the percentage of successful outcomes for the response variables, while the abscissa represents analysis numbers. The total number of analyses is 218, arrayed in equal number (109) on either side of the *Phillips* opinion.

105. With a significant, positive slope.

106. *r*=.815.

Phillips opinion. Moreover, in both periods, the slope of the trend in rates is insignificant. Accordingly, from the *post-Phillips* landscape emerges a contrasting picture. It appears to reveal a lessening of the claim construction effect (i.e., significant movement in the direction of greater doctrinal predictability), while at the same time revealing a relatively steady and high[107] average rate of claim construction modification. Thus, at least one of the fundamentals of the claim construction effect, a comparatively high level of claim construction modification, seems still to be in place in equivalents jurisprudence.

Another fundamental of the claim construction effect also remains: very high penetration of equivalents analyses by claim construction doctrine. In the *pre-2000* period, 68.7-percent of equivalents analyses involved claim construction, while in the *post-Phillips* era, a significantly higher number, 92.7-percent, of analyses contained claim construction. Thus, to the extent Figure 5 suggests some dissipation of the claim construction effect post-*Phillips*, it is clear that a residue of the claim construction effect is a very strong relationship between claim construction and the doctrine of equivalents.

Another aspect of the claim construction effect that appears to have remained after *Phillips* is differences in the propensity of judges to modify lower court claim constructions and to affirm. Because of the limited number of available decisions, it is not possible to compare each Federal Circuit judge individually in the period spanning the *Phillips* opinion and the end of the dataset.[108] Instead, in Tables 7 and 8 groups of judges are compared. Table 7 shows that after the *Phillips* opinion, significant differences remain between judges associated with different methodological approaches to claim construction.

107. Compare with *pre-2000*, *supra* Table 3 (reporting 19-percent).
108. Overall, there were too few analyses authored per judge in this period.

TABLE 7[109]
METHODOLOGICAL ASSOCIATION AFFECTS CLAIM CONSTRUCTION MODIFICATION AND AFFIRMED POST-PHILLIPS

	Analyses with Claim Construction Modification		Analyses Affirmed	
	Positive	*Negative*	*Positive*	*Negative*
Proceduralists	11 (44.0%)	14	16 (64.0%)	9
Swings	23 (60.5%)	15	13 (34.2%)	25
Holistics	6 (24.0%)	19	22 (88.0%)	3
Chi square	$\chi 2$ (2)=8.144, p=.017		$\chi 2$ (2)=18.429, p=.000	

The key point of Table 7 is that after the *Phillips* opinion issued, the treatment of lower court judgments still appears to be influenced by judges who strongly identify with substantively different views on how to analyze claim construction. It is important to note, however, that Table 7 does not show that proceduralists continue to author opinions evincing a proceduralist approach, or that holistics continue to author opinions evincing a holistic approach.[110] However, it suggests that competition, or at least a framework for inter-judge competition with respect to claim construction, remains at the Federal Circuit.

Table 8, like Table 4, uses two approaches to examining *affirmed* and *claim construction modification* after *Phillips*. First, using chi square, it examines subsets of analyses defined by particular explanatory variables. Second, using logistic regression, it queries the strength and direction of the impact of the various explanatory variables on the response variables *claim construction modification* and *affirmed* in the *post-2000* and *post-Phillips* periods.

In this case, due to the number of available analyses, judges were again grouped. The explanatory variables consist of analyses positive for authorship by any of the judges identified with a group. Thus, groups consist of the aggregate authorship of Judges Linn and Dyk (whose writings were implicated earlier in this part[111] as instrumental in the

109. Table 7 presents a table counting positive outcomes for the response variables *claim construction modification affirmed* in the 109 analyses after *Phillips*. Authorship of analyses for the court by members of methodological groups serves as the explanatory variable. The results of chi square testing are reported.

110. For a perspective on how these competing approaches are fared after *Phillips*, *see* R. Polk Wagner & Lee Petherbridge, *Did* Phillips *Change Anything? Empirical Analysis of the Federal Circuit's Claim Construction Jurisprudence* (draft on file with author).

111. *See* Part III.B.

claim construction effect), authorship by the claim construction methodology groups, and authorship by two additional groups of judges. The two additional groups of judges were created by grouping the judges whose writings most strongly predicted the authorship of analyses modifying (Gajarsa, Linn, Prost), or not modifying (Bryson, Rader, Clevenger), lower court claim constructions over the most recent 250 analyses (i.e., n=629–878). They were then examined in connection with the 300 *post-2000* analyses and the 109 *post-Phillips* analyses.

Table 8 provides a fascinating, albeit preliminary, insight into the impact of the *Phillips* opinion. Some judges, notably the groups including Judges Gajarsa, Linn, and Prost, and the swing judges, do not significantly change the rate at which they author analyses modifying lower court claim constructions or the rate at which they author analyses affirming. Consequently, these groups become very strong predictors of *claim construction modification* (higher odds) and *affirmed* (lower odds) in the *post-Phillips* period.

TABLE 8[112]
LOGISTIC REGRESSION MODELS FOR GROUPS OF FEDERAL CIRCUIT JUDGES POST-2000 AND POST-*Phillips*

		%CC Modified	%Change in Odds of CC Modified	% Affirmed	%Change in Odds of Affirmed	Wald	*R-Sq*
Linn & Dyk	post-2000	66.0	163.0	32.1	-57.5*	7.119	.033
	post-*Phillips*	55.0	64.0	55.0*	-17.0	.139	.002
Proceduralists	post-2000	58.3	92.3	38.1	-46.0*	5.481	.025
	post-*Phillips*	44.0	-4.9	64.0**	33.3	.372	.005
Swings	post-2000	50.6	24.9	47.2	-9.8	.166	.001
	post-*Phillips*	60.5	165.4*	34.2	-79.6***	13.554	.168
Holistics	post-2000	40.4	-30.4	54.8	47.3	2.513	.011
	post-*Phillips*	24.0	-69.9*	88.0**	633.3**	9.310	.151
Gajarsa, Linn, Prost	post-2000	59.4	92.0	43.6	-17.1	.442	.002
	post-*Phillips*	69.4	364.0***	41.7	-65.0*	6.254	.077
Bryson, Rader, Clevenger	post-2000	48.3	.9	46.1	-15.4	.435	.002
	post-*Phillips*	15.8**	- 82.1**	84.2**	366.7*	5.387	.082

By contrast, other groups of judges seem to have taken a different message from *Phillips*. Judges Bryson, Rader, and Clevenger seem to have taken *Phillips* as a signal to write analyses that modify less and affirm more. The rate at which this group of judges modifies lower court claim constructions drops significantly between the periods, and the rate at which they affirm lower court decisions jumps sharply. Judges Linn and Dyk—judges whom before *Phillips* had some of the highest rates of claim construction modification and some of the lowest affirmance rates—modestly, but not significantly, change the rate at which they modify lower court claim constructions, but they, too, seem to have received a signal to affirm significantly more frequently.

112. The first two columns of Table 8 set forth the explanatory variables and show which period of Federal Circuit history is being examined. The third column of Table 8 reports the percentage of analyses authored that modify lower court claim construction determinations. The fourth column reports the effect of group authorship on the odds of a positive outcome for *claim construction modification*. The fifth column reports the percentage of analyses authored that affirm lower court judgments. The sixth column reports the effect of group authorship on the odds of a positive outcome for *affirmed* based on group authorship. The seventh and eighth columns report measures of the significance, and strength and direction of relationships, respectively to the response variable *affirmed*. Throughout, the superscripts and corresponding probabilities (*p values*) are: †≤0.1, *≤0.05, **≤0.01, ***≤0.001. *Wald* χ^2 reports a *chi square* value for the predictive effect; the higher the value, the more strongly significant the result. *R sq* refers to *Nagelkerke's* R^2, a pseudo R^2 measurement that seeks to measure strength of association between explanatory and response variables. Between 0 and 1, larger values reflect stronger associations.

In the *post-Phillips* period, the holistics—whose overall claim construction philosophy prevailed in the opinion—author claim construction modifications at an even lower rate and affirm at a very high rate. Complementing this development, the proceduralists are authoring writings with a pattern of content that seems to suggest that they understand the *Phillips* opinion to have rejected the normative validity of their approach. As a group, their authorship of claim construction modifications is down, while the rate at which they author analyses affirming lower courts climbs significantly.

Taken together, these results paint a mixed picture. On the one hand, some predictability appears to have returned to the doctrine of equivalents as evidenced by the significant upward trend in *affirmed*.[113] On the other hand, the retreat of the claim construction effect left in place a high rate of claim construction in equivalents analyses as well as evidence that the Federal Circuit still changes lower court claim constructions about half of the time.

Part of the explanation is that the court has changed the rate at which it modifies a lower court claim construction, and yet still affirms.[114] Beyond that, however, Table 8 in particular may help to explain the situation. One of the messages of *Phillips* seems to be "start affirming." Another message seems to be "reduce the rate of modification of lower court claim constructions." But the first message appears to be appreciably stronger than the second message. Moreover, the judges of the court do not uniformly receive either message. Compared to the *post-2000* period, some judges show no change and in some instances even increase their propensity to modify lower court claim constructions and reject lower court judgments.

In sum, a lot of what appears to be happening is a change in the willingness of some judges to affirm. This change, in light of a 45-percent rate of *claim construction modification* and marked differences between judges in propensity to modify and affirm, indicates that the current state of affairs may be unstable. All it might take for the claim construction effect to return in force is for some judges to lose the willingness to affirm, suggesting that the court may not yet be out of the woods.

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113. *See* Figure 5.

114. There are significant differences between the *post-2000* and *post-Phillips* period in this regard, $\chi 2(1)=5.67$, $p=.017$, but not between the *pre-2000* period and *post-Phillips*, $\chi 2(1)=.113$, $p=.737$.

IV. Concluding Remarks & Some Implications for the Success of the Federal Circuit

This study paints somewhat of a colorful picture of the Federal Circuit and it performance over the last fifteen years. Below, I briefly consider three topics that I see as directly related to the question of implementation—the question of whether the Federal Circuit is succeeding: (1) the significance of the increase in the impact of claim construction; (2) the significance of the judicial contribution to the mechanism of the claim construction effect; and (3) the significance of the *Phillips* opinion and its apparent jurisprudential impact.

A. *The Impact of Claim Construction*

An important perspective of the Federal Circuit offered through this analysis is one of a court that has developed claim construction doctrine to the point that it has become a dominating lever for a distinct group of major patent doctrines. This study concerns itself with the doctrines that comprise the "doctrine of equivalents"; thus, future work is necessary to determine the extent to which claim construction doctrine has come to play this role with respect to other patent doctrines (e.g., validity doctrines). Nevertheless, given the centrality of claim construction to nearly all patent issues, there are legitimate reasons to suspect that this feature of Federal Circuit jurisprudence may well have developed in connection with other substantive doctrinal areas.

The prospect of claim construction jurisprudence developing in this direction has important implications for the institutional design of the patent system. By developing claim construction into a dominating force over other doctrines, the Federal Circuit has initiated the development of a tool that, because of its broad reach and often case-dispositive nature, can move patent jurisprudence closer to the "tantalizing dream"[115] of greater predictability and certainty.

The rub is the difficulty that the court seems to have had in developing claim construction jurisprudence. Previous work has documented high reversal rates for lower court claim constructions at various times over the Federal Circuit's history,[116] as well as competition and conflict in the development of the court's approach to the analysis of the issue.[117] Thus, while the court has succeeded at elevating the importance of claim construction, it seems to be struggling to produce a doctrine that can be reliably used by lower tribunals. This study adds significantly to this

115. Chu, *supra* note 23, at 1143.
116. *See generally supra* note 24 (collecting studies reporting reversal rates).
117. Wagner & Petherbridge, *supra* note 18.

body of knowledge by providing evidence that problems with claim construction doctrine can have repercussions in other doctrinal areas.

But this study has also shown that the court can have high levels of claim construction in its analyses and still sometimes affirm at a high rate. Thus, it is at least possible to imagine that the Federal Circuit can handle high levels of claim construction in its jurisprudence, making the tantalizing dream of greater predictability and certainty seem all the more a possible goal.

In the final analysis, however, there has always been the question of the extent to which claim construction can be made to be predictable and clear. As claim construction involves the task of translating words into definite boundaries for intangible concepts that exist at the leading edge of human knowledge, it seems irrefutable that perfect clarity and certainty is impossible. In choosing claim construction for such a dominating role, the task of making it efficiently serve the public interest falls heavily on the Federal Circuit. And while the jury is out on whether the law can develop and refine the claim construction inquiry so that it may efficiently serve the important public goals of the patent system, the wisdom of the choice will almost certainly—fairly or unfairly—be charged to the Federal Circuit.

In any event, by more tightly linking other substantive doctrines to claim construction, the Federal Circuit may be entrenching a policy of its decisional law that reads: "as goes claim construction, so too goes the case." Only time will tell if this study is a report of the genesis of a clearer and more predictable jurisprudence which is ever more efficient and workable through motions practice and without fact-finders, or whether this study is the canary in the coal mine, detecting a patent law that is moving toward a relatively high and sustained level of procedural uncertainty and unpredictability.

B. *On the Judicial Contribution to the Claim Construction Effect*

Another important perspective on the institutional design of the Federal Circuit offered by this study is that the court is capable of seemingly dynamic jurisprudential development. Recent criticism of the Federal Circuit has sought to develop the argument that areas of law assigned to the Federal Circuit lack development because the court lacks competition from other circuits.[118] The results of this study, while far from

118. *See* Craig Allen Nard & John Duffy, *Rethinking Patent Law's Uniformity Principle*, 101 NW. U. L. REV. 1619, 1627 (2007) (concluding that the "key mistake" in the creation of the Federal Circuit was in "too easily concluding that if having thirteen appellate courts with jurisdiction over patent appeals created too much inconsistency and diversity, then the correct solution was to centralize all authority into one court"). This view is not universal. *See* S. Jay Plager & Lynne E. Pettigrew, *Rethinking Patent Law's Uniformity Principle: A Response to*

showing that the court develops its jurisprudence at an optimal rate or to an optimal set of decisional rules, suggest that Federal Circuit jurisprudence was somewhat dynamic from 1992 to 2007. This observation, in light of the fact that the court is noticeably engaged with the patent component of its jurisprudence in its *en banc* work,[119] and given that the Supreme Court has granted certiorari for a number of patent-related issues over the history of the Federal Circuit,[120] suggest, more broadly, the

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Nard and Duffy, 101 NW. U. L. REV. 1735 (2007) (challenging the claim that patent law would develop better if judges from different circuits were added to the jurisdiction); *see also* Rochelle Cooper Dreyfuss, *The Federal Circuit: A Continuing Experiment in Specialization*, 54 CASE W. RES. L. REV. 769, 770 (2004) ("Practitioners appear to be in general agreement that centralizing patent appeals in a single court is a vast improvement over regional adjudication.").

119. *See, e.g.*, *In re* Bilski, 264 Fed. App'x. 896 (Fed. Cir. 2008); Egyptian Goddess, Inc. v. Swisa, Inc., 256 Fed. App'x. 357 (Fed. Cir. 2007); *In re* Seagate Tech., LLC, 214 Fed. App'x. 997 (Fed. Cir. 2007); DSU Med. Corp. v. JMS Co., 471 F.3d 1293 (Fed Cir. 2006); SmithKline Beecham Corp. v. Apotex Corp., 403 F.3d 1328 (Fed. Cir. 2005); Phillips v. AWH Corp., 376 F.3d 1382 (Fed. Cir. 2004); Honeywell Int'l, Inc. v. Hamilton Sundstrand Corp., 370 F.3d 1131 (Fed. Cir. 2004); Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp., 344 F.3d 1336 (Fed. Cir. 2003); Eli Lilly & Co. v. Barr Labs., 251 F.3d 955 (Fed. Cir. 2001) (en banc) (accepting petition for rehearing en banc, vacating the panel's opinion entered, and reassigning the appeals to the panel); Johnson & Johnston Assocs. v. R.E. Serv. Co., 238 F.3d 1347 (Fed. Cir. 2001); Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 187 F.3d 1381 (Fed. Cir. 1999); Midwest Indus. v. Karavan Trailers, 175 F.3d 1356 (Fed. Cir. 1999); Cybor Corp. v. FAS Techs., 138 F.3d 1448 (Fed. Cir. 1998); *In re* Zurko, 142 F.3d 1447 (Fed. Cir. 1998); Pall Corp. v. Micron Separations, 62 F.3d 1402 (Fed. Cir. 1995) (ordering sua sponte en banc rehearing, and after additional briefing by the parties and amici curiae, oral argument, and submission to the court en banc, ordering the appeals decided by the panel to which they were originally submitted); *In re* Trovato, 60 F.3d 807 (Fed. Cir. 1995); Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538 (Fed. Cir. 1995); Markman v. Westview Instruments, Inc., 52 F.3d 967 (Fed. Cir. 1995); *In re* Alappat, 33 F.3d 1526 (Fed. Cir. 1994); Hilton Davis Chem. Co. v. Warner-Jenkinson Co., 45 F.3d 442 (Fed. Cir. 1993); *In re* Donaldson Co., 981 F.2d 1236 (Fed. Cir. 1992); A.C. Aukerman Co. v. R.L. Chaides Constr. Co., 935 F.2d 1262 (Fed. Cir. 1991); *In re* Dillon, 919 F.2d 688 (Fed. Cir. 1990); Beatrice Foods Co. v. New England Printing & Lithographing Co., 899 F.2d 1171 (Fed. Cir. 1990); Aerojet-General Corp. v. Mach. Tool Works, Oerlikon-Buehrle, Ltd., 895 F.2d 736 (Fed. Cir. 1990); Racing Strollers, Inc. v. Tri Indus., Inc., 878 F.2d 1418 (Fed. Cir. 1989); Kingsdown Med. Consultants, Ltd. v. Hollister, Inc., 863 F.2d 867 (Fed. Cir. 1988); Pennwalt Corp. v. Durand-Wayland, Inc., 833 F.2d 931 (Fed. Cir. 1987); Woodard v. Sage Prods., 818 F.2d 841 (Fed. Cir. 1987); Wyden v. Comm'r, 807 F.2d 934 (Fed. Cir. 1986); Sri Int'l v. Matsushita Elec. Corp., 775 F.2d 1107 (Fed. Cir. 1985); *In re* Bennett, 766 F.2d 524 (Fed. Cir. 1985); Paulik v. Rizkalla, 760 F.2d 1270 (Fed. Cir. 1985); *In re* Etter, 756 F.2d 852 (Fed. Cir. 1985); Atari, Inc. v. JS & A Group, Inc., 747 F.2d 1422 (Fed. Cir. 1984).

120. *See, e.g.*, Quanta Computer, Inc. v. LG Elecs., Inc., 128 S. Ct. 28 (2007); Microsoft Corp. v. AT&T Corp., 127 S. Ct. 467 (2006); KSR Int'l Co. v. Teleflex Inc., 548 U.S. 902 (2005); MedImmune, Inc. v. Genentech, Inc., 546 U.S. 1169 (2006); eBay Inc. v. MercExchange, L.L.C., 546 U.S. 1029 (2005); Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 546 U.S. 999 (2005); Ill. Tool Works Inc. v. Indep. Ink, Inc., 545 U.S. 1127 (2005); Merck KGaA v. Integra Lifesciences I, Ltd., 543 U.S. 1041 (2005); Holmes Group, Inc. v. Vornado Air Circulation Sys., Inc., 534 U.S. 1016 (2001); Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 533 U.S. 915 (2001); J.E.M. AG Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 531 U.S. 1143 (2001); Fla. Prepaid Postsecondary Educ. Expense Bd. v. Coll. Sav. Bank, 525

possibility that areas of law assigned to the Federal Circuit can be developed within its existing appellate structure.

Along the same vein, the example of the claim construction effect reveals that diversity and competition in views can be infused into patent jurisprudence by the addition of new judges. This means of jurisprudential change, while not entirely ignored, has not been broadly emphasized in connection with the Federal Circuit. This study, at a minimum, reinforces the potential significance of the identity of Federal Circuit judges in the development of the law, and may justify policymakers' close inspection of future candidates for appointment to the court. A smaller point, also supported by the results here is that while new judges may have been instrumental in the claim construction effect, they do not seem to be required to stimulate inter-judge competition. All that appears to be necessary is for some fraction of judges[121] to begin to emphasize a new development in a component of the court's jurisprudence.

Thus, while some may be troubled by the role that Judge Linn and Judge Dyk appear from these results to have played in the development the claim construction effect, I do not believe that their contribution is negative. To the contrary, observed within reason, noticeable inter-judge differences can be an important part of a healthy jurisprudence, particularly when it introduces and promotes new ideas with which the court is ultimately forced to grapple.

C. *A View on the Significance of* Phillips

The final perspective[122] of the Federal Circuit and its role in the design of the patent system is an extension of the first point of this section. Considered in light of the deep and potentially widespread impact of claim construction on other substantive patent doctrines, the court's be-

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U.S. 1064 (1999); Pfaff v. Wells Elecs., Inc., 523 U.S. 1003 (1998); Dickinson v. Zurko, 525 U.S. 961 (1998); Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 516 U.S. 1145 (1996); Markman v. Westview Instruments, Inc., 515 U.S. 1192 (1995); Cardinal Chem. Co. v. Morton Int'l Inc., 506 U.S. 813 (1992); Eli Lilly & Co. v. Medtronic, Inc., 493 U.S. 889 (1989); Dennison Mfg. Co. v. Panduit Corp., 475 U.S. 809 (1986).

121. A single judge may be enough; take, for example, Judge Lourie's strong association with the genesis and development of court's modern written description jurisprudence. *See, e.g.*, Fiers v. Revel, 984 F.2d 1164 (Fed. Cir. 1993) (Lourie, J.), Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559 (Fed. Cir. 1997) (Lourie, J.), The Gentry Gallery, Inc. v. The Berkline Corp., 134 F.3d 1473 (1998) (Lourie, J.), Enzo Biochem, Inc. v. Gen-Probe Inc., 323 F.3d 956 (Fed. Cir. 2002) (Lourie, J.), Univ. of Rochester v. E.D. Searle, 358 F.3d 916 (Fed. Cir. 2003) (Lourie, J.).

122. A perspective that will get short shrift in this Article is that *Phillips* may have addressed some arguments for overruling *Cybor* (establishing de novo review of claim construction). Arguments attacking *Cybor* on the theory that it leads to a lack of procedural certainty are at least somewhat diminished by the sharp uptick in affirmances that follows the *Phillips* opinion, *see* Figure 5.

havior after the *Phillips* opinion is potentially a cause for concern. The concern is that *Phillips* may portend an increasingly inscrutable patent jurisprudence and the suppression of the development of the substantive patent law.[123]

The reason stems from the observation that *Phillips* may have signaled the entrenchment of a "customized," as opposed to a "prescriptive," model for Federal Circuit decision-making. In contrasting "customized" to "prescriptive," what I mean is the following: the "customized" model is a model of decision-making that is very case-specific, and in which opinions will more rarely have precedential bite beyond technologies and sets of facts that are very highly similar. The "prescriptive" model contrasts in the sense that it features opinions written to be read more broadly and to have precedential bite across a wider set of technologies and facts.[124]

The *Phillips* holding is most easily understood as imposing a customized model. It holds that there is no correct way to "do" claim construction,[125] effectively allowing judges to craft highly customized rationales. If the Federal Circuit thinks the trial court has made a smart decision, it can easily defer. If the Federal Circuit disagrees, it can just as easily reverse. There is little in the way of rules to constrain the court's decision-making.

Conventional justifications for a more "customized" model of decision-making include notions of reasonableness and a need for sensible departures from rules that, should they be rigorously applied, might lead to absurd or inefficient results. This model of decision-making is conventionally seen as useful where the range of relevant facts might vary widely, and where the stakes of the cases might be quite high. It is, perhaps, most commonly associated with tort law and its general standard of reasonableness.

Patent law is often considered to be analogous to tort law.[126] Certainly the stakes are often high, and the fact that situations develop from the seemingly infinite number of technologies that might be associated with a patent can be tremendously diverse. Thus, in patent cases, there might well be justifications for absorbing the high administrative costs of litigating some cases.

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123. *But see* Cotropia, supra note 82 (arguing that Phillips represents a step in a desirable direction because the methodology it elects implies a particular claim scope paradigm).

124. Another way to describe this difference is to say that the "customized" model emphasizes the decision itself, while the "prescriptive" model places substantially greater weight on the writing that the court produces, and how clearly it guides the decision-making of competitors for resources.

125. *See supra* note 101.

126. Mars, Inc. v. Coin Acceptors, Inc., 527 F.3d 1359, 1365 (2008) ("Patent Infringement is a tort.").

It is also true, however, that the overwhelming majority of patents are not made the subject of litigation.[127] If the court has adopted a model that allows it the flexibility to craft the "right" result in high value cases, but has done so at the expense of a decrease in clearer and broader guidance, the Federal Circuit may be developing the patent law to a point where it is actually inviting cases from patentees and competitors that might not have before needed the courts to resolve any differences.

Even more to the point, in using the holistic approach to claim construction as a lever to customize its patent jurisprudence, the Federal Circuit could be moving in the direction of obfuscating the principles, policies, and rules that animate its decisions. This possibility is perhaps most evident in Figure 5, which reveals that somehow, right after the *Phillips* opinion, the Federal Circuit was able to turn on a dime, and initiate a sharp upward trend in the rate at which it affirms trial courts.[128] Other hints that the court might be transitioning in this direction are in Table 8, which shows significant decreases in the propensity of certain judges to modify lower court claim constructions and significant increases in the likelihood of certain judges to affirm.

The *Phillips* holding is consonant with the idea that the direction the court is heading is toward less clarity and predictability. In holding that there is no correct way to "do" claim construction, it has effectively removed rules that might have constrained the court's behavior and provided valuable information to the patent system. The court may now be more encouraged to go where it wants by manipulating claim construction, rather than by working with substantive patent doctrines. Moreover, because holisticism allows a court to justify a claim construction for almost any reason, it is not clear that district courts, or the judges of the Federal Circuit, will be encouraged (or even permitted in law) to speak with predictive force on, for example, the question of when it is appropriate (or inappropriate) to limit a claim based on a picture in a patent, or based on a textual description of an embodiment. It is this feature of *Phillips* in particular, combined with the prospect that claim construction may be the ultimate patent law lever that suggests *Phillips* may portend the suppression of the development of substantive patent law.

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127. *See, e.g.*, Mark A. Lemley, Essay, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. Rev. 1495 (2001) (arguing that this fact undercuts proposals to implement more intensive patent examination).

128. There is no question that the Federal Circuit is a hard-working court, and thus, it should not have taken long for it to exhaust the set of appeals from lower courts that had not considered *Phillips*. Nonetheless, this seemingly quick turnabout is curious.