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The Federal Circuit's Experimental Prism

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ARTICLE

THE FEDERAL CIRCUIT'S EXPERIMENTAL PRISM

*Jeremy W. Bock**

Whether the U.S. Court of Appeals for the Federal Circuit is succeeding in its role as the steward of decisional patent law has been the subject of considerable debate and many empirical studies for the past forty years. Based on these studies, some observers have expressed skepticism of the utility of that court's exclusive, nationwide jurisdiction over patent appeals. But the substantial body of empirical literature on the Federal Circuit has been viewed largely from a single vantage point, one that attributes any negative or undesirable outcomes to the court's specialization. This Article argues that there is another way to look at the data: the Federal Circuit's institutional design actually makes it easier to discern the weaknesses in the rules, practices, and conventions governing the creation of precedents in the federal appellate courts that would otherwise be obscured due to confounders and the length of time necessary to accumulate datapoints.

This raises a question: to what extent are the problems with the Federal Circuit attributable to specialization as opposed to weaknesses in the day-to-day operational procedures commonly used throughout the federal courts of appeals? To explore this question, this Article makes the novel claim that, if there were a judicial analogue to a "lab rat" that can be used to study the operation of the federal appellate courts, the Federal Circuit may be it. Notably, the court follows many of the same rules, practices, and conventions employed in the regional circuits for creating precedents (e.g., opinion assignment rules, use of nonprecedential opinions, the "prior panel rule") and has the same primary tools for correcting its caselaw (i.e., en banc rehearings and review by the U.S. Supreme Court), but it operates in an environment where doctrinal percolation and iteration have been sped up

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and where the evolution of a specific area of the law can be clearly tracked. To extend the “lab rat” analogy further, the Federal Circuit provides a convenient environment to test new rules and practices for precedent management because its jurisdictional isolation from the rest of the court system may allow it to serve as an experimental sandbox.

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INTRODUCTION

Old is a film by M. Night Shyamalan about a secluded beach that ages its visitors several decades in a single day; if a child visits the beach in the morning, they are middle-aged by the following day.¹ The twist is that the beach is used by pharmaceutical companies to conduct human trials of new drugs.² The utility of a beach that rapidly ages its visitors is akin to that of

1. OLD (Universal Pictures 2021).

2. *See id.*

lab animals with short life spans: we can see the progression of disease and the effects of a possible treatment in weeks or months rather than in years or decades. The average life span of mice—the canonical lab animal—is two years,³ whereas for humans, it is 76.4 years.⁴

In some ways, studying the operation of the federal courts can be difficult because of the time it takes to discern various phenomena. The pace of common law development is seemingly slow by design. As a result, it can be difficult to figure out whether some operational practice that affects day-to-day adjudication—whether new or long-standing, promulgated by statute or informally adopted by a court—might have unintended consequences. For example, if we wanted to figure out how the use of seniority as an organizing principle among federal appellate judges might affect the development of precedents, it may take many years, if not decades, to collect the data to find out. And even if we did collect the data, it might be noisy due to confounders that may arise in the intervening years and decades, making statistically reliable analysis difficult.

As it turns out, we might actually have a beach for rapid aging in the federal judiciary that might provide opportunities for discerning phenomena that might otherwise be obscured by time. It is the U.S. Court of Appeals for the Federal Circuit.

In 1982, the Federal Circuit was established⁵ to provide an exclusive appellate forum for patent cases.⁶ Professor Rochelle C. Dreyfuss famously described the Federal Circuit's creation as a “sustained experiment in specialization”⁷ by Congress, which assumed that a single, specialized⁸ appellate court would produce a coherent, uniform body of precedent that would bring certainty and predictability to patent law.⁹ In the four decades since the court's creation, a rich literature has emerged that has scrutinized

3. Sulagna Dutta & Pallav Sengupta, *Men and Mice: Relating Their Ages*, 152 LIFE SCIS. 244, 247 (2016).

4. *Life Expectancy*, CTRS. FOR DISEASE CONTROL & PREVENTION, <https://www.cdc.gov/nchs/fastats/life-expectancy.htm> [<https://perma.cc/APN6-RB42>] (last visited Oct. 6, 2023).

5. Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25 (codified as amended in scattered sections of the U.S.C.).

6. 28 U.S.C. § 1295(a)(1).

7. Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1, 3 (1989).

8. According to some commentators, the Federal Circuit might be viewed as a “semi-specialized” court because its limited subject matter jurisdiction includes several discrete areas of the law. William M. Landes & Richard A. Posner, *An Empirical Analysis of the Patent Court*, 71 U. CHI. L. REV. 111, 112 (2004). However, to streamline the discussion, this Article will use the term “specialized” rather than “semi-specialized” in describing the Federal Circuit.

9. Hon. Robert W. Kastenmeier, Remarks at the Ninth Annual Judicial Conference of the United States Court of Customs and Patent Appeals (May 25, 1982), in 94 F.R.D. 347, 358 (1982).

myriad aspects of the court in order to assess whether the Federal Circuit “experiment” has been successful.¹⁰

Overall, the Federal Circuit’s stewardship of decisional patent law has received mixed reviews.¹¹ Commentators have criticized its caselaw as being overly formalistic, prone to indeterminacy, and susceptible to panel-dependent outcomes driven by intra-circuit conflicts, among other complaints.¹² Some observers, including Judge Diane P. Wood of the U.S. Court of Appeals for the Seventh Circuit, have expressed skepticism regarding the Federal Circuit’s exclusive jurisdiction, primarily on the ground that it impairs adequate percolation in the development of decisional patent law.¹³ Those who tout the virtues of generalist judges are bound to view the Federal Circuit’s specialization with suspicion.¹⁴

Over the past couple of decades, empirical analysis has emerged as an important and highly influential tool for evaluating the Federal Circuit’s performance. According to Professor Jason Rantanen, “[o]utside of the Supreme Court . . . the Federal Circuit is probably the most empirically analyzed court in history, with nearly every aspect of its decisions measured and reported,”¹⁵ presumably to figure out whether the “experiment” has been successful.

However, there is more than one angle from which the empirical studies of the Federal Circuit may be viewed. This Article argues that it is not entirely clear to what extent the Federal Circuit’s perceived ills are attributable to its subject matter specialization, as opposed to any weaknesses in the rules, practices, and conventions for producing and managing caselaw that are commonly in use throughout the thirteen federal courts of appeals, including the Federal Circuit. Other than its highly specialized (or idiosyncratic) subject matter jurisdiction, the Federal Circuit’s day-to-day operation as a federal appellate court is substantially similar—if not practically identical in certain material aspects—to that of the regional circuits in how it decides cases and manages its precedents.

10. See generally Ryan Vacca, *The Federal Circuit as an Institution*, in 2 RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW 104–158 (P. Menell, B. Depoorter & D. Schwartz eds., 2019) (synthesizing literature on the Federal Circuit).

11. See John M. Golden, *Redundancy: When Law Repeats Itself*, 94 TEX. L. REV. 629, 634–35 (2016) (“Although the Federal Circuit has suffered a hailstorm of criticism for its performance as a centralized appellate tribunal for patent law, the circuit has commonly—if sometimes grudgingly—received praise for success in clarifying various aspects of patent law’s content and application.”).

12. See *infra* Part I.A.

13. See generally Diane P. Wood, *Keynote Address: Is It Time to Abolish the Federal Circuit’s Exclusive Jurisdiction in Patent Cases?*, 13 CHI.-KENT J. INTELL. PROP. 1 (2013); Craig Allen Nard & John F. Duffy, *Rethinking Patent Law’s Uniformity Principle*, 101 NW. U. L. REV. 1619 (2007).

14. Some of the most vocal proponents of a generalist judiciary are other federal appellate judges. See Edward K. Cheng, *The Myth of the Generalist Judge*, 61 STAN. L. REV. 519, 520–22 (2008).

15. Jason Rantanen, *Empirical Analyses of Judicial Opinions: Methodology, Metrics, and the Federal Circuit*, 49 CONN. L. REV. 227, 230 (2016). In making this claim, Rantanen lists over eighty empirical studies. *Id.* at 230 n.5, 283–87.

For example, the Federal Rules of Appellate Procedure (FRAP) apply to the Federal Circuit.¹⁶ As in the regional circuits, cases are decided at the Federal Circuit by three-judge panels,¹⁷ opinion assignments are made by the most senior judge in the majority,¹⁸ and the decisional law created by a prior panel is deemed binding precedent that may be overruled only by an en banc court.¹⁹ The primary means for correcting Federal Circuit precedents are en banc review and U.S. Supreme Court review, which are the same corrective mechanisms available to the other federal appellate courts.²⁰ Federal Circuit judges are Article III appointees who serve on their appointed court for life and are each assisted by up to four law clerks, most of whom change annually.²¹ Although each federal court of appeals may have its own local “Circuit Rules” and “Internal Operating Procedures” (IOPs),²² certain local practices that have a material impact on day-to-day adjudication are remarkably similar across circuits, including the Federal Circuit.²³

In setting up the Federal Circuit, Congress concentrated cases in a specific area of the law in a single appellate court and gave it a mandate to create a coherent and stable body of caselaw—while equipping it with essentially the same tools used in the other federal courts of appeals. This Article argues that, in doing so, Congress unwittingly created an “experiment” in more ways than one. That is, the Federal Circuit should not be viewed merely as an experiment to assess whether specialized courts are “good” or “bad.” Rather, the concentration of cases in a specific legal area at the Federal Circuit may actually create an environment that makes it possible to “stress test” certain rules, practices, and conventions commonly used in the federal courts of appeals. This would allow us to learn things about the federal courts that would otherwise be difficult to observe due to confounders and the difficulty of gathering enough datapoints to conduct empirical analysis with sufficient statistical power to detect certain effects.²⁴

In a couple of ways, the Federal Circuit’s specialized jurisdiction may allow it to serve as a “lab rat” for the rest of the federal courts of appeals—

16. See FED. R. APP. P. 1(a)(1).

17. See 28 U.S.C. § 46(c). The Federal Circuit may also decide cases by panels larger than three judges (e.g., five-judge panels). See *id.* However, it rarely does. See Elizabeth I. Winston, *Differentiating the Federal Circuit*, 76 MO. L. REV. 813, 822–23 (2011).

18. See Cheng, *supra* note 14, at 527 n.35 (describing the various opinion assignment arrangements in the federal courts of appeals, many of which allow presiding judges or those with greater seniority to influence opinion assignments).

19. See Joshua A. Douglas & Michael E. Solimine, *Precedent, Three-Judge District Courts, and the Law of Democracy*, 107 GEO. L.J. 413, 450 n.212 (2019).

20. See FED. R. APP. P. 35; 28 U.S.C. § 1254.

21. See *infra* notes 61–62 and accompanying text.

22. An appellate court’s Circuit Rules and IOPs are usually available on its website. For example, these documents for the Federal Circuit are available at *Rules, Procedures, & Forms*, U.S. CT. OF APP. FOR FED. CIR., <https://cafc.uscourts.gov/home/rules-procedures-forms/> [<https://perma.cc/QG6U-5QWW>] (last visited Oct. 6, 2023).

23. See *infra* Part I.B.2.

24. See ROBERT M. LAWLESS, JENNIFER K. ROBBENOLT & THOMAS ULEN, *EMPIRICAL METHODS IN LAW* 203–04 (2d ed. 2016).

for the purposes of both diagnosing weaknesses in its processes and crafting treatments.

First, the progression of precedent development is sped up and compressed at the Federal Circuit—by virtue of its case concentration—such that we can see the full life cycle and evolution of doctrines under circumstances with fewer confounders than in the regional circuits. A useful analogy is the lab mouse or fruit fly, whose short life span allows us to study the effectiveness of potential cancer cures or discover new truths about our physiology because we can readily observe the progression of disease and the effect of treatments in a matter of months rather than decades, as would be the case if the testing were carried out in humans.²⁵ Likewise, we can more clearly see at the Federal Circuit how well (or poorly) the rules, practices, and conventions that are commonly used by the federal appellate courts operate because its exclusive jurisdiction provides the court with a concentration of cases in a particular subject matter that has the effect of accelerating the time for precedent development. As a result, certain phenomena may be revealed in a few years at the Federal Circuit that might be discernable only after a few decades (or not at all due to confounders) in the rest of the federal court system.

Second, the subject matter isolation of the Federal Circuit from the rest of the appellate courts may allow it to serve as a sandbox for testing new rules and practices without impacting the rest of the federal court system. And, because of the accelerated progression of precedent development at the Federal Circuit, any new rules or proposed reforms can be stress-tested within a reasonable time frame before being rolled out to the rest of the federal courts of appeals.

By (re)analyzing the empirical literature on the Federal Circuit in light of its “experimental” characteristics, we may achieve a better understanding of what is actually happening at that court (and more broadly in the rest of the federal court system); this, in turn, can help us craft solutions for mitigating its undesirable behaviors (and those of the federal appellate courts more generally). Indeed, the process of analyzing, studying, and attempting to reform the Federal Circuit can yield data that may allow us to make better decisions when introducing reforms in the regional circuits, where experimentation—and the impact of mistakes—can be more difficult, costly, and wide-reaching.

This Article proceeds in three parts. Part I sets forth the complaints about the Federal Circuit and posits a diagnostic problem: Are the Federal Circuit’s problems primarily due to its specialization or, rather, to the fact that it is a federal court (i.e., many of its rules and conventions are similar to those used by most federal appellate courts)? Or some combination of both? Part II explains how the weaknesses in the rules and conventions used in the federal courts may be revealed more clearly and vividly in the Federal Circuit because its specialization creates conditions that allow existing practices to

25. See *infra* notes 89–94 and accompanying text.

be stress-tested on an accelerated time frame. Part III addresses potential caveats regarding the generalizability of empirical studies of the Federal Circuit. It also analyzes the extent to which the Federal Circuit's problems might be attributable to specialization, suggests possible reforms, and is followed by a brief conclusion.

I. BACKGROUND

A. Complaints About the Federal Circuit

A rich literature exists that scrutinizes the Federal Circuit's decisions and its decision-making process. The court has been criticized for, among other things, its penchant for formalism,²⁶ panel-dependent outcomes,²⁷ insufficient deference to trial courts on factual issues,²⁸ uneven application of administrative law principles,²⁹ failure to consider relevant scholarship,³⁰ problematic use of no-opinion summary affirmances,³¹ and lack of attention to the industry-specific realities of innovation policy.³² The Federal Circuit's

26. See, e.g., David O. Taylor, *Formalism and Antiformalism in Patent Law Adjudication: Rules and Standards*, 46 CONN. L. REV. 415, 420 n.16 (2013) (collecting sources criticizing the Federal Circuit's "overly formalistic rule-based adjudication"); see also Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1670 (2003) ("We think it unwise for courts to set bright-line rules in areas where their effect on innovation may be uncertain.").

27. See, e.g., R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding?: An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1112 (2004) ("[T]he composition of the panel that hears and decides an appeal has a statistically significant effect on the claim construction analysis.").

28. See, e.g., Arti K. Rai, *Specialized Trial Courts: Concentrating Expertise on Fact*, 17 BERKELEY TECH. L.J. 877, 879 (2002) (observing that the Federal Circuit has "denominat[ed] questions that have factual foundations—for example, mixed questions of law and fact such as claim construction—as pure questions of law" subject to de novo review); see also William C. Rooklidge & Mathew F. Weil, *Judicial Hyperactivity: The Federal Circuit's Discomfort with Its Appellate Role*, 15 BERKELEY TECH. L.J. 725, 726 (2000) ("Unfortunately, the court from time to time appears to lose track of the important distinction between trial and appellate roles and engages in what might be termed 'judicial hyperactivity'—a form of decision-making at odds with traditional notions of appellate review.").

29. See, e.g., Sapna Kumar, *The Accidental Agency?*, 65 FLA. L. REV. 229, 258 (2013) ("[F]or patent cases from the PTO and ITC, the court's review resembles the non-deferential approach . . . of an agency reviewing an administrative law judge more than a federal court reviewing an . . . agency. This is particularly interesting given that the Federal Circuit's review of non-patent agencies appears to be quite deferential.").

30. See, e.g., Craig Allen Nard, *Toward a Cautious Approach to Obeisance: The Role of Scholarship in Federal Circuit Patent Law Jurisprudence*, 39 HOUS. L. REV. 667, 685 (2002) ("[T]he court verges on the abstract by failing to give adequate weight to empirical and economic scholarship.").

31. See, e.g., Dennis D. Crouch, *Wrongly Affirmed Without Opinion*, 52 WAKE FOREST L. REV. 561, 562 (2017) ("[T]he appellate court's steady practice of no-opinion judgments runs contrary to the law. Both the Patent Act and the Lanham Act require the Federal Circuit to provide an opinion when issuing a judgment on an appeal from the Patent and Trademark Office."); Paul R. Gugliuzza & Mark A. Lemley, *Can a Court Change the Law by Saying Nothing?*, 71 VAND. L. REV. 765, 766 (2018) ("Our findings suggest that, by saying nothing, a court can indeed affect substantive law, or at least the perception of it.").

32. See, e.g., Rochelle Cooper Dreyfuss, *The Federal Circuit: A Continuing Experiment in Specialization*, 54 CASE W. RES. L. REV. 769, 782 (2004) ("[D]espite the systematic effect

subject matter specialization is often the designated culprit for a variety of perceived deficiencies and faults, given the literature's uneasiness with and suspicion of specialized courts as being susceptible to capture and prone to "tunnel vision" from the loss of the generalist perspective.³³ As such, some proposals to reform the Federal Circuit have sought to mitigate or lessen its specialization in some way, such as by removing its exclusive jurisdiction over patent appeals³⁴ or by modifying the composition of its docket.³⁵

Although specialization is, perhaps, the most salient feature of the Federal Circuit vis-à-vis the regional circuits, it is not always clear whether this attribute, in and of itself, is the predominant underlying cause of many of its perceived performance deficiencies relative to the regional circuits. Indeed, the possibility exists that certain faults endemic to multimember judging in a federal appellate court may be contributing factors, and such faults may be easier to perceive at the Federal Circuit precisely because of its specialization. The implications of this distinction are what this Article seeks to explore: When we complain about the Federal Circuit, is it because of problems that are allegedly caused by specialization? Or, are we seeing problems that likely occur in all federal appellate courts, which the Federal Circuit's specialization happens to reveal more clearly and vividly? Or, is it some combination of both?

To the extent that there have been attempts to unravel this issue, the literature is scant. One notable contribution is a speech delivered in 2001 by Judge Randall R. Rader of the Federal Circuit, in which he responded to certain complaints about the court.³⁶ Judge Rader argued that the Federal Circuit was being "judged by the wrong standard"³⁷ because the concentration of patent appeals due to its exclusive jurisdiction "dramatically accelerated the pace of common law development"³⁸ in patent law. Judge Rader compared the rate of precedent development in the regional circuits to that in the Federal Circuit and estimated that decisional patent law developed

of the court's interpretation of the law on patent scope, the court never considers the effect of this construction on the biotechnology industry.").

33. See generally LAWRENCE BAUM, *SPECIALIZING THE COURTS* 32–41 (John M. Conley & Lynn Mather eds., 2011).

34. See, e.g., Nard & Duffy, *supra* note 13, at 1625 ("We propose that, in addition to the Federal Circuit, at least one extant circuit court should be allowed to hear district court appeals relating to patent law."); Wood, *supra* note 13, at 9 ("Under the alternative regime I envision, parties would have a choice: they could take their appeals to the Federal Circuit, thereby benefiting from that court's long experience in the field, or they could file in the regional circuit in which their claim was first filed.").

35. See, e.g., Paul R. Gugliuzza, *Rethinking Federal Circuit Jurisdiction*, 100 GEO. L.J. 1437, 1445 (2012) ("I propose assigning to the court a cross-section of cases—including commercial cases—that are currently appealed to the regional circuits. The Federal Circuit would not have exclusive jurisdiction over these cases, but it would retain its exclusive jurisdiction over patent cases.").

36. Randall R. Rader, *The United States Court of Appeals for the Federal Circuit: The Promise and Perils of a Court of Limited Jurisdiction*, 5 MARQ. INTELL. PROP. L. REV. 1 (2001).

37. *Id.* at 4–5.

38. *Id.* at 4.

at a rate “more than twenty times the pace” of either copyright or trademark law in the average regional circuit.³⁹ As a result, Judge Rader argues, intra-circuit conflicts that would arise years or even decades apart in the regional circuits may occur only months apart in the Federal Circuit.⁴⁰

Although Judge Rader has connected the dots between the effect of specialization and the pace of adjudication (along with the impact on the rate of intra-circuit conflicts), others have focused on whether specialization actually improves decisional quality. As Rochelle Dreyfuss notes, “the Federal Circuit sees almost every appellate patent case; the regional circuits do not usually entertain disputes in any one field with enough regularity to comprehend all of the law’s subtleties or to fine-tune it.”⁴¹ But if the Federal Circuit is any indication, seeing every case is not sufficient, by itself, to lead to better caselaw development. Indeed, as Dreyfuss further observes: “[I]f underlying facts or policies change, the Federal Circuit should be in a better position than regional circuits to adapt the law. Unfortunately, the [Federal] Circuit appears rather resistant to considering new facts.”⁴²

But is the failure to timely reconsider caselaw a flaw that is typical of specialized courts? Or is it a failing specific to the Federal Circuit itself? Would a generalist court be more willing to reconsider caselaw sooner? Or is the ability of a court to adapt and reconsider its precedents more a function of its composition at a particular time, the rules under which the court operates, and/or additional unknown factors?

How the Federal Circuit’s performance should be assessed is a complicated matter because it is arguably affected by a combination of factors, some of which are not present in the regional circuits—such as the effect of specialization—whereas other factors are common among the federal courts of appeals—namely, many of the rules, practices, and conventions related to precedent creation and management.

B. Complaints Common to Appellate Courts

The Federal Circuit’s mandate to create and maintain a uniform, stable, and coherent body of precedent governing patent law has resulted in considerable scrutiny of its decision-making process. But the problems with its stewardship over decisional patent law may be partly grounded in a variety of issues that can also plague other courts of appeals. That is, precedents may be (or become) suboptimal for reasons that are not unique to patent law or the Federal Circuit. For example, a major category of suboptimal precedents includes those that are unsettled, conflicting, or otherwise unclear. The law may be unsettled because the judges on a multimember court are deeply split over the scope of some doctrine, as illustrated by the current

39. *Id.* at 3–4.

40. *Id.* at 9.

41. Rochelle Cooper Dreyfuss, *In Search of Institutional Identity: The Federal Circuit Comes of Age*, 23 BERKELEY TECH. L.J. 787, 795 (2008).

42. *Id.* at 795 n.37.

controversy over the test for patent eligibility.⁴³ Even in the absence of a deep split among the judges, the law could become muddled when conflicting precedents emerge over time as a byproduct of repeated adjudication by different panels.⁴⁴ Conversely, the overreliance on nonprecedential dispositions and a lack of precedential opinions on a recurring issue may give rise to a lack of clarity about the law.⁴⁵

Another category of suboptimal precedents consists of standards and flexible rules that are difficult to apply consistently, which may give rise to indeterminacy. A canonical example is the set of precedents for claim construction, which is the process for ascertaining “the scope of the patentee’s rights under the patent.”⁴⁶ And finally, a body of precedent considered to be clear, settled law that is relatively straightforward to apply may nevertheless be suboptimal if it is normatively problematic in some way. For example, a body of precedent may be too broad (or narrow) in scope, strike a poor balance among competing interests, or be outdated in light of changes in technology or society. Some of the Federal Circuit’s bright-line

43. See, e.g., *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 967 F.3d 1285 (Fed. Cir. 2020) (2-1 decision with spirited dissent). The order denying the petition for rehearing en banc in this case reveals a 6-6 split among the Federal Circuit’s twelve active judges, six of whom dissented from the denial of the petition, while the remaining judges either concurred or acquiesced in the denial. See *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 966 F.3d 1347 (Fed. Cir. 2020) (order denying petition).

44. See *Hart v. Massanari*, 266 F.3d 1155, 1179 (9th Cir. 2001) (“[P]ublishing redundant opinions will multiply significantly the number of inadvertent and unnecessary conflicts, because different opinion writers may use slightly different language to express the same idea [E]ven small differences in language can have significantly different implications when read in light of future fact patterns”).

45. A recent example is the reluctance of the Federal Circuit to issue precedential orders when deciding petitions for a writ of mandamus relating to venue transfer motions. For example, in *In re TracFone Wireless, Inc.*, the Federal Circuit, in a nonprecedential order, directed Judge Alan D. Albright of the U.S. District Court for the Western District of Texas to promptly rule on a fully briefed transfer motion. 848 F. App’x 899, 901 (Fed. Cir. 2021). The court reasoned that “lengthy delays in resolving transfer motions can frustrate the intent of § 1404(a).” *Id.* at 900. Because improper delays in the disposition of transfer motions have been a recurring issue, a group of patent law professors filed a motion under FED. CIR. R. 32.1(e) and asked the Federal Circuit to reissue the *TracFone* order as precedential. See Motion to Reissue Ord. as Precedential, *In re TracFone Wireless, Inc.*, No. 21-118 (Fed. Cir. May 7, 2021), ECF No. 8. The Federal Circuit denied the motion. Ord., *In re TracFone Wireless, Inc.*, No. 21-118 (Fed. Cir. June 2, 2021), ECF No. 15. Although the Federal Circuit eventually issued a precedential order in another case on the impropriety of undue delays in the disposition of transfer motions, it did so twenty months after *TracFone*, during which time a high volume of patent cases were being filed in Judge Albright’s Western District of Texas courtroom. See *In re Apple Inc.*, 52 F.4th 1360 (Fed. Cir. 2022); Ryan Davis, *After Rules Shake-Up, Albright Remains the Top Patent Judge*, LAW360 (Feb. 15, 2023, 12:14 AM), <https://www.law360.com/articles/1573848/after-rules-shake-up-albright-remains-the-top-patent-judge> [<https://perma.cc/6SAS-C7R5>]. It is possible that the case management trajectory of a substantial number of cases could have been affected by an earlier-issued precedential order.

46. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970 (Fed. Cir. 1995), *aff’d*, 517 U.S. 370 (1996); see also J. Jonas Anderson & Peter S. Menell, *Informal Deference: A Historical, Empirical, and Normative Analysis of Patent Claim Construction*, 108 NW. U. L. REV. 1 (2013); David L. Schwartz, *Practice Makes Perfect?: An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223 (2008).

rules have been shown to be suboptimal in this regard.⁴⁷ Suboptimal precedents can arise and persist when the appellate court is deadlocked (which can yield intra-circuit splits), as well as when it is unanimous (which can leave suboptimal precedents stuck in place).

The creation of suboptimal precedents invariably occurs both at the Federal Circuit and in the regional circuits because they are multimember courts staffed by humans. Because of the Federal Circuit's specialized jurisdiction, the degree, frequency, and impact of the various types of suboptimal caselaw it produces may be different from that of the regional circuits. However, the primary tools available to the Federal Circuit and the regional circuits for correcting suboptimal precedents are identical: en banc sittings and Supreme Court review. More generally, as explained later in this section,⁴⁸ many of the rules, practices, and conventions in use at the Federal Circuit that affect the process of adjudication and the creation of precedents are similar, if not identical, to those used in the regional circuits. And to the extent that the Federal Circuit has different procedures, it is not clear that they materially change the character of the court in ways that spare it from sharing certain vulnerabilities with the regional circuits.

1. Practices Specific to the Federal Circuit

The Federal Circuit was created with a stewardship mandate over a particular area of the law, but it was hardly given any special tools over and above those commonly in use in the other federal appellate courts. There are, however, a couple of special procedures at the Federal Circuit that relate to the pre-issuance review of precedential opinions: the full-court circulation of draft precedential opinions and their review by the Senior Technical Assistant (STA) for conflicting precedents.⁴⁹

Circulation of Draft Precedential Opinions. In order to better fulfill its mandate to create a coherent body of decisional patent law, the Federal Circuit, at its inception, adopted a procedure whereby every draft precedential opinion is circulated to the full court for a certain number of working days (currently ten) prior to issuance.⁵⁰ This is intended to allow

47. Examples include the rule for near-automatic injunctions upon a finding of infringement, which was overruled by the Supreme Court in *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006), and the overexpansive application of the doctrine of assignor estoppel, which was overruled by the Supreme Court in *Minerva Surgical, Inc. v. Hologic, Inc.*, 141 S. Ct. 2298 (2021).

48. See *infra* Part II.B.2.

49. See Jeremy W. Bock, *Restructuring the Federal Circuit*, 3 N.Y.U.J. INTELL. PROP. & ENT. L. 197, 206–08 (2014).

50. C.J. Howard T. Markey, Remarks at the First Annual Judicial Conference of the United States Court of Appeals for the Federal Circuit (May 20, 1983), in 100 F.R.D. 499, 502 (“[W]hen a panel has completed work on an opinion and it is ready to issue, that opinion is circulated . . . to all the non-panel members of the Court.”); see also U.S. CT. OF APP. FOR THE FED. CIR., INTERNAL OPERATING PROC. 10, ¶ 5 (Mar. 1, 2022) (“When all panel votes are in on a precedential opinion or order, the authoring judge circulates the opinion . . . to the full court. The nonpanel members of the court will have ten working days to review all circulated opinions and orders.”).

non-panel judges to provide feedback before a precedential opinion is issued.⁵¹

The Senior Technical Assistant. The office of the STA, for which specific authorization exists under 28 U.S.C. § 715, was originally set up as an internal administrative department within the Federal Circuit.⁵² The STA was initially charged with reviewing every draft precedential opinion prior to issuance and notifying the entire court of any conflicts with existing caselaw, so as to allow opinion authors to make corrections before issuance.⁵³ However, over the past decade, the STA's role has been steadily scaled back, whereby it no longer receives (and thus no longer prepares a memo on) every draft precedential opinion, but instead prepares an analysis only upon request by a judge.⁵⁴

Overall, these two special operational features of the Federal Circuit appear to have limited impact, given the persistence of deep intra-circuit conflicts and panel-dependent outcomes on fundamental issues such as claim construction.⁵⁵ It is possible that situational and behavioral factors have prevented these procedures from being used to their fullest extent: the non-authoring judges (especially the non-panel members) may be insufficiently (or infrequently) willing to undertake the additional effort to carefully review every draft precedential opinion and provide feedback, whereas the authoring judge may be insufficiently willing to revise their draft precedential opinions in light of such feedback (either from other judges or the STA).⁵⁶ That is, the special procedures at the Federal Circuit that were initially adopted to promote coherence in a body of precedent may not be attracting the level of effortful compliance necessary to materially enhance the way that the court manages its caselaw (as compared to what happens in the regional circuits).

For this reason, some of the operational practices that may end up having the most impact on the day-to-day administration of justice at the Federal Circuit may be those that operate without requiring effortful work by a judge, such as conventions for staffing panels, opinion assignments, seniority rules, procedures for invoking en banc review, and the like. As explained below, there are many such rules that render the Federal Circuit's operation very similar to that of the regional circuits.

2. Practices Common Among the Federal Appellate Courts

There are a variety of rules, practices, and conventions that impact the dynamics of appellate adjudication and the creation of precedents that are

51. Markey, *supra* note 50, at 502–03.

52. See Bock, *supra* note 49, at 206–08.

53. Markey, *supra* note 50, at 502.

54. See Bock, *supra* note 49, at 207–08.

55. See *infra* Part II.B.2.a.

56. Cf. Richard A. Posner, *What Do Judges and Justices Maximize?: (The Same Thing Everybody Else Does)*, 3 SUP. CT. ECON. REV. 1, 2 (1993) (observing that “judicial utility” is a function of, among other things, leisure).

common to many, if not all, federal appellate courts, including the Federal Circuit. In fact, other than its specialized subject matter jurisdiction, the fundamental, day-to-day operation of the Federal Circuit shares material similarities with most of the regional circuit courts.⁵⁷

For example, like the regional circuits, the Federal Circuit is an Article III court with life-tenured judges.⁵⁸ It has twelve authorized judgeships,⁵⁹ which is the median number of appellate judgeships among the circuit courts, given that half of the regional circuits have twelve or fewer authorized judgeships.⁶⁰ Much like their regional circuit counterparts, each Federal Circuit judge in regular active service may employ up to four law clerks,⁶¹ many of whom serve one-year terms,⁶² just like the law clerks in the regional circuits. And like the rest of the federal judiciary, Federal Circuit judges who take senior status assume a lightened case load and continue to sit on panels to hear cases.⁶³

Appellate practice at the Federal Circuit, as in the regional circuits, is governed by various provisions of Title 28 of the U.S. Code, the FRAP, local “Circuit Rules” that supplement the FRAP, and the court’s Internal Operating Procedures. The life of an appeal at the Federal Circuit resembles that of an appeal in the rest of the federal court system⁶⁴: after a case is docketed, there is briefing, oral argument,⁶⁵ the issuance of a decision (which can take a variety of forms, such as a (non)precedential opinion or a summary disposition), and an opportunity to seek rehearing.⁶⁶ Cases are assigned randomly to a panel of three judges.⁶⁷ On each panel, the presiding judge is

57. A federal appellate court has some leeway to adopt local circuit rules and internal operating procedures. *See* 28 U.S.C. § 2071(a). To the extent that there may be operational differences between the various circuits, they are largely differences of degree.

58. *Judges*, U.S. CT. OF APP. FOR FED. CIR., <https://cafc.uscourts.gov/home/the-court/judges> [<https://perma.cc/7G5G-QE8D>] (last visited Oct. 6, 2023).

59. 28 U.S.C. § 44(a).

60. The regional circuits with twelve or fewer authorized judgeships are the District of Columbia, First, Seventh, Eighth, Tenth, and Eleventh Circuits. *Id.*

61. *See Judges*, *supra* note 58.

62. *Cf.* Perry Cooper, *Want to Clerk?: Consider the Federal Circuit, Former Clerks Say*, BLOOMBERG L. (Mar. 11, 2021, 3:50 PM), <https://news.bloomberglaw.com/ip-law/want-to-clerk-consider-the-federal-circuit-former-clerks-say> [<https://perma.cc/V7DW-DUDT>].

63. *See Judges*, *supra* note 58.

64. A general description of the appellate process in the courts of appeals is provided under the “Three-Judge Panels” heading at *Appellate Courts and Cases—Journalist’s Guide*, U.S. CTS., <https://www.uscourts.gov/statistics-reports/appellate-courts-and-cases-journalists-guide> [<https://perma.cc/9XZX-LFXD>] (last visited Oct. 6, 2023).

65. Whether oral argument may be granted or denied can vary depending on the case. *See* FED. R. APP. P. 34(a)(2).

66. For a visual outline of the appeals process at the Federal Circuit, see the diagram entitled *The Life of an Appeal in the Federal Circuit* on the Federal Circuit’s website at *Case Filings*, U.S. CT. OF APP. FOR FED. CIR., <https://cafc.uscourts.gov/home/case-information/case-filings/> [<https://perma.cc/8K4W-ZZXW>] (last visited Oct. 6, 2023).

67. U.S. CT. OF APP. FOR THE FED. CIR., INTERNAL OPERATING PROC. 3, ¶ 1 (Nov. 14, 2008). There may be exceptions to strictly random panel assignment, such as avoiding conflicts of interest. A general discussion of departures from strictly random assignments in the regional circuits is provided in Marin K. Levy, *Panel Assignment in the Federal Courts of Appeals*, 103 CORNELL L. REV. 65 (2017).

the most senior judge in regular active service⁶⁸ and has the power to assign opinion authorship if they are a member of the majority.⁶⁹

As in many of the regional circuits, cases at the Federal Circuit may be decided through a precedential opinion/order, a nonprecedential opinion/order, or a summary affirmance.⁷⁰ The Federal Circuit also follows the “prior panel rule”⁷¹ that is used in nearly every circuit, whereby a precedent created by a single panel of three judges binds the circuit and can be overruled only by an en banc court absent Supreme Court review or an act of Congress.⁷² Because certiorari petitions are rarely granted,⁷³ the primary mechanism by which precedents are corrected or overruled in the federal appellate courts (including the Federal Circuit) is through an en banc sitting, which appellate courts try to avoid because it is deemed a labor-intensive endeavor⁷⁴ that can heighten tension on the court,⁷⁵ and which carries the distinct possibility of disappointing everyone involved (e.g., when there is no majority opinion).⁷⁶ The federal judiciary’s aversion to en banc proceedings is in keeping with Rule 35(a) of the FRAP, which states: “An en banc hearing

68. 28 U.S.C. § 45(b); *see also* U.S. CT. OF APP. FOR THE FED. CIR., INTERNAL OPERATING PROC. 1, ¶ 2 (Nov. 14, 2008) (providing definition of “Presiding Judge”).

69. U.S. CT. OF APP. FOR THE FED. CIR., INTERNAL OPERATING PROC. 8, ¶ 2 (Nov. 14, 2008).

70. U.S. CT. OF APP. FOR THE FED. CIR., INTERNAL OPERATING PROC. 9, ¶ 1 (Sept. 21, 2011).

71. *See* FED. CIR. R. 35(a)(1) (specifying that “only the court en banc may overrule a binding precedent”). The “prior panel rule” is also known as the “rule of interpanel accord.” Wyatt G. Sassman, *How Circuits Can Fix Their Splits*, 103 MARQ. L. REV. 1401, 1427 n.176 (2020).

72. *See* Michael Duvall, *Resolving Intra-Circuit Splits in the Federal Courts of Appeal*, 3 FED. CTS. L. REV. 17, 18 n.4 (2009) (compiling cases). A notable outlier is the Seventh Circuit, in which “[a] proposed opinion approved by a panel . . . adopting a position which would overrule a prior decision . . . shall not be published unless it is first circulated among the active members of this court and a majority of them do not vote to rehear en banc.” 7TH CIR. R. 40(e).

73. *The Supreme Court at Work*, SUP. CT. U.S., <https://www.supremecourt.gov/about/courtatwork.aspx> [<https://perma.cc/9F5N-TKS8>] (last visited Oct. 6, 2023) (“Each Term, approximately 5,000-7,000 new cases are filed in the Supreme Court Plenary review, with oral arguments by attorneys, is currently granted in about 80 of those cases each Term”).

74. *See* Douglas H. Ginsburg & Donald Falk, *The Court En Banc: 1981-1990*, 59 GEO. WASH. L. REV. 1008, 1020 (1991) (estimating that, at the D.C. Circuit, “one case reheard en banc consumes as much of the court’s resources as five or six cases heard by a panel”).

75. *See* Patricia M. Wald, *Changing Course: The Use of Precedent in the District of Columbia Circuit*, 34 CLEV. ST. L. REV. 477, 488 (1986) (“No judge likes to have her opinions en banc, and although she may expect it from those with whom she frequently disagrees, she may resent it from usual allies. Some judges do indeed regard a vote in favor of en bancing their cases as tantamount to betrayal.”); *see also* Tracey E. George, *The Dynamics and Determinants of the Decision to Grant En Banc Review*, 74 WASH. L. REV. 213, 218 n.23 (1999) (collecting sources). The culture of a court may determine the extent to which collegiality considerations might affect the likelihood of an en banc sitting. *Cf.* Marcia Coyle, *When Rulings, Respectfully, Offer Peek Behind Curtains at Court Collegiality*, LAW.COM (Mar. 11, 2021, 3:11 PM), <https://www.law.com/nationallawjournal/2021/03/11/when-rulings-respectfully-offer-peek-behind-curtains-at-court-collegiality/> [<https://perma.cc/XKG2-TQ22>].

76. *See* Ginsburg & Falk, *supra* note 74, at 1019–20.

or rehearing *is not favored and ordinarily will not be ordered . . .*⁷⁷ The reluctance to sit en banc similarly exists at the Federal Circuit.⁷⁸ According to a study by Professors Peter Menell and Ryan Vacca, the Federal Circuit's average en banc rate for patent cases from 1988 to 2017 was 0.29 percent, which is similar to the combined average en banc rate of the regional circuits (0.26 percent).⁷⁹ As for attention from the Supreme Court, the total number of Federal Circuit cases decided by the high court (59) and its reversal rate (71.2 percent) from 2007 to 2022 are comparable to that of most of the regional circuits.⁸⁰ On average, the Federal Circuit does not appear to be prone to either greater scrutiny or neglect from the high court.

In the general federal courts literature focusing on judicial behavior and related topics, commentators have raised concerns regarding a variety of common operational practices of the federal courts of appeals. Areas of concern include the impact of the "prior panel rule" on precedent development,⁸¹ ideological voting and panel effects,⁸² the overreliance on nonprecedential (or unpublished) dispositions,⁸³ the rarity of oral argument,⁸⁴ the role of law clerks in drafting opinions,⁸⁵ the difficulty of sitting en banc,⁸⁶ and the difficulty of obtaining timely high court review on matters critical to the day-to-day operation of the courts of appeals,⁸⁷ among others.

77. FED. R. APP. P. 35(a) (emphasis added).

78. See Perry Cooper, *Full Court Patent Review Bids Often 'Waste of Time,' Judge Says*, BLOOMBERG L. (Feb. 23, 2021, 5:55 AM), <https://news.bloomberglaw.com/ip-law/full-court-patent-review-bids-often-waste-of-time-judge-says> [https://perma.cc/PHN8-ECE3] ("Most petitions for rehearing [en banc] are 'a waste of time and a waste of money,' [Judge Todd Hughes] said."); see also William C. Rooklidge & Matthew F. Weil, *En Banc Review, Horror Pleni, and the Resolution of Patent Law Conflicts*, 40 SANTA CLARA L. REV. 787, 795 (2000) ("Judges being human, en banc cases can cause friction between the judges on the Federal Circuit.")

79. Peter S. Menell & Ryan Vacca, *Revisiting and Confronting the Federal Judiciary Capacity "Crisis": Charting a Path for Federal Judiciary Reform*, 108 CAL. L. REV. 789, 862 (2020).

80. *SCOTUS Case Reversal Rates (2007 - Present)*, BALLOTPEDIA, [https://ballotpedia.org/SCOTUS_case_reversal_rates_\(2007_-_Present\)](https://ballotpedia.org/SCOTUS_case_reversal_rates_(2007_-_Present)) [https://perma.cc/T6NG-GJZD] (last visited Oct. 6, 2023).

81. See, e.g., Phillip M. Kannan, *The Precedential Force of Panel Law*, 76 MARQ. L. REV. 755 (1993).

82. See *infra* notes 113–117 and accompanying text.

83. See, e.g., David C. Vladeck & Mitu Gulati, *Judicial Triage: Reflections on the Debate over Unpublished Opinions*, 62 WASH. & LEE L. REV. 1667 (2005).

84. See, e.g., David R. Cleveland & Steven Wisotsky, *The Decline of Oral Argument in the Federal Courts of Appeals: A Modest Proposal for Reform*, 13 J. APP. PRAC. & PROCESS 119 (2012).

85. See, e.g., Perry Dane, *Law Clerks: A Jurisprudential Lens*, 88 GEO. WASH. L. REV. ARGUENDO 54 (2020); Albert Yoon, *Law Clerks and the Institutional Design of the Federal Judiciary*, 98 MARQ. L. REV. 131 (2014).

86. See, e.g., Alexandra Sadinsky, Note, *Redefining En Banc Review in the Federal Courts of Appeals*, 82 FORDHAM L. REV. 2001 (2014).

87. See, e.g., Amanda L. Tyler, *Setting the Supreme Court's Agenda: Is There a Place for Certification?*, 78 GEO. WASH. L. REV. 1310 (2010).

Due to the common operating characteristics it shares with the rest of the federal appellate courts, many of the above-mentioned concerns are relevant to the Federal Circuit as well.

II. THE FEDERAL CIRCUIT AS AN EXPERIMENTAL TOOL

As mentioned previously, the Federal Circuit's creation in 1982 was aptly termed an "experiment in specialization" by Rochelle Dreyfuss⁸⁸ in the sense that Congress was creating a new type of court. But the nature of this "experiment" has more than one facet, and it may teach us not only about the Federal Circuit's performance but also about the operation of the regional circuits. The latter facet is something that has not received as much attention in the literature. Indeed, it raises two issues. First, to what extent are the perceived deficiencies of the Federal Circuit attributable to the fact of its specialization as opposed to weaknesses in the rules, practices, and conventions generally in use throughout the federal appellate courts (including at the Federal Circuit)? Second, how can we apply what we learn from this alternative experimental facet to mitigate those aspects of the Federal Circuit's decision-making that have been shown to be problematic?

As explained in the remainder of this Article, the specialized nature of the Federal Circuit may allow it to be used, in certain respects, as an experimental tool to study the federal courts, which, at the same time, might also provide clues on how the Federal Circuit's operation might be improved. There are three implications that flow from this.

First, akin to an animal model used in laboratories to study human physiology, the Federal Circuit's specialization may give it certain properties that allow it to effectively stress-test various appellate court practices and to study their possible long-term effects in an observable time frame.

Second, by looking at the analytical frame of reference from the opposite direction, we may be given clues for improving the operation of the Federal Circuit. In particular, there may be a relationship between the benefits of generalist judging and certain temporal effects.

Third, given the relative jurisdictional isolation of the Federal Circuit and its "experimental" properties, perhaps the court can serve as a guinea pig or as a sandbox to test possible reforms—both for itself and for the regional circuits.

A. *Animal Model Analogy*

This Article argues that the specialized jurisdiction of the Federal Circuit—coupled with its adoption of many of the basic operational rules, practices, and conventions commonly in use in the regional circuits—may allow us to observe certain phenomena and weaknesses in the federal courts' adjudicatory practices that might otherwise be difficult to discern. At first blush, this might seem counterintuitive, given the Federal Circuit's idiosyncratic docket arising from its nationwide, exclusive appellate

88. Dreyfuss, *supra* note 7, at 3.

jurisdiction over certain types of cases. But this characteristic may actually create conditions that can make it easier to assess the robustness (or lack thereof) of certain practices commonly in use throughout the federal courts of appeals.

To the extent that there are differences between the Federal Circuit and the regional circuit courts—most notably the former’s specialized docket—our observations of the Federal Circuit can nevertheless provide lessons for the regional circuits depending on what is being studied. Specifically, if the relevant characteristic under study is similar—if not identical—in material ways between the two types of courts, then useful lessons may be gleaned despite the existence of other differences.

This principle concerning relevant similarities is what allows us to study certain aspects of human physiology by using lab animals that possess similar or analogous characteristics. For example, mice are mammals that share 99 percent of their genes with humans⁸⁹ and have been used to study aging,⁹⁰ cardiovascular disease,⁹¹ and cancer.⁹² Fruit flies are another popular animal model for studying human physiology, given that “nearly 75% of human disease-causing genes are believed to have a functional homolog in the fly.”⁹³ Notably, fruit flies have been sent to the International Space Station to study the physiological effects of long-duration space missions on astronauts.⁹⁴

Even though there are substantial physiological differences between humans and nonhuman organisms, such as mice and fruit flies, there exist certain physiological similarities between them that operate in very similar ways. For example, many mammals, including humans, exhibit the involuntary fight-or-flight response in similar ways, such as dilated pupils, raised hair follicles, and increased heart rate.⁹⁵ Cell division occurs in

89. Mark S. Boguski, *The Mouse That Roared*, 420 NATURE 515, 515 (2002) (“Ninety-nine per cent of [protein-coding genes in the mouse genome] have a sequence match in the human genome . . .”).

90. See, e.g., Rong Yuan, Luanne L. Peters & Beverly Paigen, *Mice as a Mammalian Model for Research on the Genetics of Aging*, 52 INST. FOR LAB’Y ANIMAL RSCH. J. 4 (2011).

91. See, e.g., Carlos Zaragoza, Carmen Gomez-Guerrero, Jose Luis Martin-Ventura, Luis Blanco-Colio, Begona Lavin, Benat Mallavia, Carlos Tarin, Sebastian Mas, Alberto Ortiz & Jesus Egido, *Animal Models of Cardiovascular Diseases*, J. BIOMEDICINE & BIOTECHNOLOGY, Jan. 2011, at 1.

92. See, e.g., Jessica C. Walrath, Jessica J. Hawes, Terry Van Dyke & Karlyne M. Reilly, *Genetically Engineered Mouse Models in Cancer Research*, 106 ADVANCES CANCER RSCH., 113, 113 (2010).

93. Udai Bhan Pandey & Charles D. Nichols, *Human Disease Models in Drosophila melanogaster and the Role of the Fly in Therapeutic Drug Discovery*, 63 PHARMACOLOGICAL REVS. 411, 412 (2011).

94. Fruit Fly Lab, *Tiny Flies Make Big Biology Happen in Space*, NASA (Mar. 29, 2018), <https://www.nasa.gov/ames/fruit-fly-lab> [<https://perma.cc/57LP-HRCL>].

95. See Elizabeth Coon, *Overview of the Autonomic Nervous System*, MERCK MANUAL (July 2023), <https://www.merckmanuals.com/home/brain,-spinal-cord,-and-nerve-disorders/autonomic-nervous-system-disorders/overview-of-the-autonomic-nervous-system> [<https://perma.cc/7S7Q-6MQ9>]; see also Julian Meyer Berger, Parminder Singh, Lori Khrimian, Donald A. Morgan, Subrata Chowdhury, Emilio Arteaga-Solis, Tamas L. Horvath, Ana I. Domingos, Anna L. Marsland, Vijay Kumal Yadav, Kamal Rahmouni, Xiao-Bing Gao & Gerard Karsenty, *Mediation of the Acute Stress Response by the Skeleton*, 30 CELL

humans, mice, and fruit flies through a common mechanism—the eukaryotic cell cycle.⁹⁶ Depending on what aspect of human physiology is of interest and the manner in which the research study is designed, the use of nonhuman organisms has been critical to advancing our understanding of human physiology and exploring potential treatments for human diseases.

There are several characteristics that make certain nonhuman organisms particularly well-suited for biomedical research:

Accelerated Life Cycle. Organisms with relatively short life spans, such as mice (twenty-four months)⁹⁷ and fruit flies (two to three months)⁹⁸ are useful for studying conditions that may take years, a life time, or even several generations to develop in humans, such as chronic diseases due to unhealthy lifestyle choices, health problems arising from exposure to potential carcinogens, and the impact of genetic mutations or abnormalities. The accelerated life cycle of lab animals also allows us to evaluate the effectiveness of potential treatments and strategies for mitigating such conditions.

Availability of Sufficient Observations/Datapoints for Statistical Power. The ease of breeding mice and fruit flies allows laboratory studies to run experiments with sample sizes large enough to reliably detect real effects, as well as to repeat experiments as necessary. This mitigates the likelihood of Type I errors (i.e., false positives), in which the detected effect is not reliable, and Type II errors (i.e., false negatives), in which a condition that actually exists is not detected.⁹⁹

Standardization of Parameters to Minimize Confounders. Nonhuman organisms are amenable to procedures that allow certain experimental parameters to be fixed or customized to minimize confounders. For example, genetically identical strains of mice are often used in experiments to enhance accuracy and repeatability.¹⁰⁰ Mouse strains can also be customized with particular characteristics for specific research projects. For example, it is possible to order specific types of immunodeficient mice for infectious disease research.¹⁰¹

METABOLISM 890, 890 (2019) (describing stress phenomenon seen in both rodents and humans).

96. See *The Eukaryotic Cell Cycle*, NAT'L LIBR. MED., <https://www.ncbi.nlm.nih.gov/books/NBK9876/> [<https://perma.cc/D9BJ-KX7M>] (last visited Oct. 6, 2023) (excerpting Geoffrey M. Cooper, *THE CELL: A MOLECULAR APPROACH* (2d ed. 2000)).

97. Dutta & Sengupta, *supra* note 3, at 247.

98. Yaning Sun, Jason Yolitz, Cecilia Wang, Edward Spangler, Ming Zhan & Sige Zou, *Aging Studies in Drosophila melanogaster*, in *BIOLOGICAL AGING: METHODS AND PROTOCOLS* 77 (Trygve O. Tollefsbol ed., 2013).

99. See Philip Dubé, *Animal Research Sample Size Calculation (and Consequences)*, TACONIC BIOSCIENCES, INC. (Dec. 21, 2017), <https://www.taconic.com/taconic-insights/quality/animal-research-sample-size-calculation.html> [<https://perma.cc/527X-68HJ>].

100. See *What is a Mouse Model?*, JACKSON LAB'Y, <https://www.jax.org/why-the-mouse/model> [<https://perma.cc/CF8Q-TETW>] (last visited Oct. 6, 2023).

101. See *Choosing an Immunodeficient Mouse Model*, JACKSON LAB'Y (Mar. 20, 2006), <https://www.jax.org/news-and-insights/2006/March/choosing-an-immunodeficient-mouse-model> [<https://perma.cc/NV6P-XZT5>].

B. Stress-Testing Practices Commonly Used by Federal Appellate Courts

Just as lab animals allow us to study physiological traits they share with humans in a controlled (or controllable) environment on a timescale that permits long-term effects to be reliably observed within a relatively short period of time, empirical investigations of the Federal Circuit might provide analogous benefits for studying the operation of the federal appellate courts. Specifically, studying the Federal Circuit may provide useful lessons regarding the intra-circuit dynamics of day-to-day adjudication among the members of a single appellate court. As explained below, the features that make lab animal experimentation useful—such as accelerated lifecycle, availability of sufficient observations/datapoints for statistical power, and standardization of parameters to minimize confounders—are either analogously present or are easier to achieve when conducting empirical analysis of the Federal Circuit than of the regional circuits. As such, these features may allow the Federal Circuit to be more amenable to certain types of empirical investigations that may be harder to carry out with regional circuit data.

1. Empirical Friendliness of the Federal Circuit Dataset

Empirical investigations of the federal appellate courts frequently entail tallying and coding decisions, cases, docket entries, and other data and characteristics about a court in order to discern trends, patterns in adjudication, and natural experiments. Because of the Federal Circuit's exclusive jurisdiction, a dataset created with its cases can be, in several key ways, more "empirically friendly" than those of the regional circuits.

A major empirical benefit of the Federal Circuit dataset is the court's accelerated precedent-development life cycle, which may allow phenomena that might be difficult to discern in a regional circuit court (e.g., because it occurs over the course of several years or decades) to be revealed more clearly in a shorter time span. Because all patent appeals are concentrated at the Federal Circuit, such that patent cases comprise almost 60 percent of the court's docket,¹⁰² each of its judges' views on the state of the law can crystallize (i.e., reach a steady state) through repeated adjudication much sooner than in the regional circuits.¹⁰³

Another empirically friendly feature is the size of the dataset. The Federal Circuit issues approximately 400 panel decisions—opinions (precedential

102. In fiscal year 2022, appeals filed in the Federal Circuit for patent cases originating in the district courts and patent-related proceedings at the U.S. Patent and Trademark Office (PTO) comprised 21 percent and 37 percent, respectively, for a total of 58 percent of appeals. *Appeals Filed, by Category FY 2022*, U.S. CT. OF APP. FOR FED. CIR. (Sept. 30, 2022), <https://cafc.uscourts.gov/wp-content/uploads/reports-stats/caseload-by-category/CaseloadbyCategory-FY2022.pdf> [<https://perma.cc/9999-S5BR>].

103. See Rader, *supra* note 36, at 4.

and nonprecedential)¹⁰⁴ and Rule 36 affirmances¹⁰⁵—in patent-related appeals annually.¹⁰⁶ Because of its exclusive jurisdiction, all patent appeals are concentrated at the Federal Circuit rather than dispersed among the twelve regional circuits. As a result, the number of decisions provides a large enough sample size that facilitates empirical analyses on a variety of aspects of the Federal Circuit—its judges, decisions, operations, etc.—in a manner that allows multiple variables to be controlled for and datasets to be customized to focus on certain phenomena, while maintaining sufficient statistical power to mitigate the possibility of obtaining unreliable results or failing to detect an effect that actually exists.¹⁰⁷ For example, there are twelve active judges on the Federal Circuit, which yields 220 combinations of three-judge panels.¹⁰⁸ Accordingly, to meaningfully analyze the behavior of any individual judge, a sufficiently large dataset is required to tease out the adjudicatory characteristics of that judge apart from that of the panel. By collecting multiple years of Federal Circuit data, scholars have been able to create datasets with a sufficient number of observations that have allowed them to isolate and analyze the adjudicatory characteristics of individual judges with statistical rigor on a range of issues affecting the development of

104. These opinions are decisions issued by the Federal Circuit’s “merits panels,” as opposed to orders issued by its “motions panel.” See U.S. CT. OF APP. FOR THE FED. CIR., INTERNAL OPERATING PROC. 1 ¶ 2 (Nov. 14, 2008) (providing definitions of panel types).

105. A Rule 36 affirmance is a summary affirmance without opinion. See FED. CIR. R. 36.

106. This number is derived from a five-year average of the number of Federal Circuit decisions in the form of opinions (both precedential and nonprecedential) and Rule 36 affirmances issued from calendar years 2016 through 2020 that originate chiefly from the district courts and the PTO. The data source used to obtain this statistic is *The Compendium of Federal Circuit Decisions* [hereinafter the *Compendium*], <https://fedcircuit.shinyapps.io/federalcompendium> [<https://perma.cc/PCN8-8SVZ>] (last visited Oct. 6, 2023); see also *The Compendium of Federal Circuit Decisions*, U. IOWA, <https://empirical.law.uiowa.edu/compendium-federal-circuit-decisions> [<https://perma.cc/X7B2-WRGC>] (last visited Oct. 6, 2023) (discussing the methodology and contents of the *Compendium*); Jason Rantanen, *The Landscape of Modern Patent Appeals*, 67 AM. U. L. REV. 985 (2018). When the *Compendium*’s document dataset was downloaded onto an Excel spreadsheet, 1,964 patent-related decisions were found during a five-year period upon applying the following spreadsheet filters: “Year”: 2016-2020; “origin”: CFC, DCT, ITC, PATO-DCT, PTO; “docType”: Opinion, Rule 36; “enBanc”: No; “DisputeType”: CMBR, Denial-Patent, EPre, Interference, IPR, IPRe, Patent Infringement, PGR, Section 337 Proceeding. The period from 2016 through 2020 was selected because there were no changes in the membership of the judges in regular, active service at the Federal Circuit during that time. See *Judge Biographies*, U.S. CT. OF APP. FOR FED. CIR., <https://cafc.uscourts.gov/home/the-court/judges/judge-biographies/> [<https://perma.cc/KMQ9-TQJW>] (last visited Oct. 6, 2023).

107. See LAWLESS ET AL., *supra* note 24, at 203–04 (discussing relationship between sample size, effect size, and power).

108. The mathematical formula for the number of combinations of three items (r) selected from twelve items (n), assuming that the order of the items does not matter and each item appears once in a combination, is: $n!/(r!(n-r)!) = 12!/(3!*9!) = 220$. See JOY MORRIS, COMBINATORICS 22–23 (2023), <https://open.umn.edu/opentextbooks/textbooks/494> [<https://perma.cc/XG6V-MV9H>].

patent law, such as variations in claim construction methodologies¹⁰⁹ and opinion authorship patterns.¹¹⁰

Another important aspect of the Federal Circuit dataset is that it can focus on a single area of the law, which can help decrease the number of variables and confounders. Otherwise, having a highly heterogeneous dataset in terms of subject matter could make it difficult to discern the existence of subtle but real effects, as well as to distinguish temporary blips and freak occurrences from actual trends. Although there are statistical techniques to control for subject matter differences, a large sample size might be necessary to avoid missing any actual effects.¹¹¹

Indeed, in the empirical literature on judicial behavior, it is not uncommon for studies to use datasets that concentrate on a specific area of the law. This can be seen in various empirical studies of ideological voting and panel composition effects.¹¹² For example, Professor Richard L. Revesz looked at environmental cases at the U.S. Court of Appeals for the D.C. Circuit.¹¹³ Professors Frank B. Cross and Emerson H. Tiller focused on the application of *Chevron*¹¹⁴ deference in administrative law cases at the D.C. Circuit.¹¹⁵ Professor Pauline Kim analyzed Title VII¹¹⁶ sex discrimination cases.¹¹⁷

To get a better sense of the difference between conducting empirical research with Federal Circuit data compared to regional circuit data, a numerical comparison may be instructive.

To begin, as mentioned above, the Federal Circuit issues about 400 panel decisions a year on patent law. Of this, about 60 percent (~240) decisions are opinions, with the remaining 40 percent (~160) being summary affirmances without opinion under Federal Circuit Rule 36.¹¹⁸ There are twelve Federal Circuit judges in regular active service, which means that an active Federal Circuit judge would author about twenty patent law opinions a year.¹¹⁹ Depending on the phenomena of interest, having a few years'

109. See *infra* Part II.B.2.a.

110. See *infra* Part II.B.2.c.

111. See *infra* note 122 and accompanying text.

112. "Panel composition effects" or "panel effects" is a phenomenon whereby "a judge's likely vote is influenced by the other two judges assigned to the same panel." Cass R. Sunstein, David Schkade & Lisa M. Ellman, *Ideological Voting on Federal Courts of Appeals: A Preliminary Investigation*, 90 VA. L. REV. 301, 303 (2004).

113. Richard L. Revesz, *Environmental Regulation, Ideology, and the D.C. Circuit*, 83 VA. L. REV. 1717, 1717 (1997).

114. *Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837 (1984).

115. Frank B. Cross & Emerson H. Tiller, *Judicial Partisanship and Obedience to Legal Doctrine: Whistleblowing on the Federal Courts of Appeals*, 107 YALE L.J. 2155, 2168 (1998).

116. 42 U.S.C. §§ 2000e to 2000e-17.

117. Pauline T. Kim, *Deliberation and Strategy on the United States Courts of Appeals: An Empirical Exploration of Panel Effects*, 157 U. PA. L. REV. 1319, 1329 (2009).

118. These statistics are derived from the *Compendium*, *supra* note 106.

119. The Federal Circuit has multiple senior circuit judges who author patent-related opinions. In the aggregate, the senior circuit judges' contributions approach that of an extra circuit judge in regular active service, as they have authored at least seventy-seven opinions (or at least 15.4 opinions per year—we don't know the authorship of per curiam opinions) from 2016 to 2020, according to data from the *Compendium*, *supra* note 106. If we were to

worth of data can reveal specific patterns about each judge's judging behaviors. This is made possible by the sheer number of opinions issued in the same types of cases (in this instance, patent law), combined with stability in the court's membership that exists for several years at a time. These empirical-friendly properties of Federal Circuit data may allow us to see more clearly how precedents evolve, whether voting patterns exist, whether there are doctrinal fault lines emerging on the court, whether some judges have an outsized influence on certain doctrines, and so on. And if there is a change in the law (whether decisional or statutory, procedural or substantive), a change in court operations, a change in court membership, or any other change of interest, the resulting natural experiments are likely amenable to analysis with substantial statistical rigor.

By removing the need to control for opinions written on different subject matter or having to wait years to get a sufficient number of observations—during which time intervening events might introduce confounders or statistical complications that can shrink the universe of usable observations—the Federal Circuit dataset is less noisy than regional circuit data. This makes it easier to conduct analyses that can more clearly reveal the extent to which the rules, practices, and conventions that are commonly used in the appellate courts are working as intended or whether they are somehow falling short.

By contrast, there are more potential confounders in a dataset associated with the regional circuits. If the Federal Circuit did not exist and patent appeals were distributed across all circuits, how many years might it take for a regional circuit judge to author twenty patent law opinions (which is the average annual number authored by a single Federal Circuit judge)?¹²⁰ In the regional circuits, there are a total of 167 authorized appellate judgeships.¹²¹ If, as mentioned previously, there are about 240 patent law-related appellate opinions to be written each year, and if patent appeals were evenly distributed across all appellate panels in all regional circuits, then each regional circuit judge would author about 1.4 patent law opinions per year. It would take, then, approximately fourteen years, on average, for a regional circuit judge to author twenty patent law opinions. Depending on the research question, the empirical utility of those twenty patent law opinions authored by a single regional circuit judge could be lower (due to noise) when compared to that of the twenty patent law opinions authored by a Federal Circuit judge in a single year. This is because, in the fourteen years it takes for a regional circuit judge to author twenty patent law opinions, there may be intervening events, such as changes in the law, changes in day-to-day

treat the senior judges in the aggregate as a de facto thirteenth active judge at the Federal Circuit, then each active judge would be writing 18.4 opinions per year on average (240 opinions / thirteen judges). To simplify the discussion, however, we will assume that all the work is being done by the actual twelve judges in regular active service, which means that each active judge would write around twenty opinions annually.

120. See *supra* text accompanying note 119.

121. There are 179 total federal appellate judgeships, of which twelve are for the Federal Circuit and 167 are allocated to the regional circuits. See 28 U.S.C. § 44(a).

internal operating procedures, and changes to court membership that may need to be controlled for or otherwise taken into consideration as possible confounders if we wanted to use those opinions to draw conclusions about the development of patent law in a particular circuit or to gauge the impact of a particular judge.

As for analyzing aggregate patent law decisions across different circuits, such a dataset may need to take into account, among other things, forum shopping at the circuit level (assuming cases are not randomly distributed among the circuits), different “laws of the circuit,” and any circuit-to-circuit variations in adjudicatory operations that are material to the phenomenon being studied. To statistically control for or to mitigate the effect of such variations, a dataset of suitable size would be required;¹²² the more variables there are, the larger the required dataset—which may necessitate the accumulation of opinions and related data over a longer period of time. And given the greater number of regional circuit judges, conducting judge-specific statistical analysis in a particular legal area that is subject to adjudication in multiple circuits may be more difficult and/or less reliable than what can be achieved with Federal Circuit data.

Ultimately, the level of statistical granularity and the types of judge-, case-, doctrine-, and process-related variables that can be explored with, say, ten years of Federal Circuit opinions may be difficult to achieve with ten years of regional circuit data—especially if we want to more easily trace the development of precedent in a particular area of law, characterize the influence of specific judges, and have enough datapoints to be able to control for certain variables and mitigate confounders while maintaining adequate statistical power. If a Federal Circuit judge is on the court for ten years and authors 200 patent law opinions, it may take a regional circuit judge 140 years to author the same number. A full cohort of twelve active Federal Circuit judges, then, would produce approximately 2,400 patent law opinions within a ten-year period. As a result, the timescale for studying how a particular area of the law evolves is compressed with Federal Circuit data. The compressed timescale decreases the likelihood of encountering (or makes it easier to mitigate) confounders that could arise due to changes in the law, personnel, or any other parameter when looking at data spanning a much longer period. Depending on the area of law, it may take *decades* to collect a dataset of 2,400 opinions on that specific area of law from a single regional circuit court. Conversely, if the 2,400 opinions were collected from multiple circuits or different subject areas, it may introduce additional variables that may need to be controlled for as discussed earlier. Simply put, the Federal Circuit dataset is empirically “cleaner,” which can allow certain

122. See Carmen R. Wilson VanVoorhis & Betsy L. Morgan, *Understanding Power and Rules of Thumb for Determining Sample Sizes*, 3 TUTORIALS QUANTITATIVE METHODS FOR PSYCH. 43, 48 (2007) (“For regression equations using six or more predictors, an absolute minimum of 10 participants per predictor variable is appropriate. However, if the circumstances allow, a researcher would have better power to detect a small effect size with approximately 30 participants per variable.”).

phenomena to be revealed that otherwise may be difficult to detect in regional circuit data.

There are limits to the utility of the Federal Circuit dataset in assessing the potential weaknesses in the operational practices commonly used throughout the federal appellate courts. Given its exclusive jurisdiction, data from the Federal Circuit may be well-suited for studying *intra*-circuit phenomena involving the day-to-day activities within a circuit court but potentially less so for issues that are substantially affected by inter-circuit dynamics, such as inter-circuit percolation, which will be addressed in greater detail in Part III.A.1.

2. Phenomena Observed at the Federal Circuit

As explained in the previous sections, the Federal Circuit's usage of many of the adjudicatory practices that are common to the regional circuit courts, coupled with its exclusive jurisdiction, allows a high concentration of cases of a particular type to be adjudicated in an accelerated precedent-development life cycle that basically "stress tests" those practices. Some practices commonly used in the federal appellate courts may, in fact, be suboptimal, but we may not discern this fact as easily in regional circuit data, especially if the impact of those practices is cumulative, occurs gradually over time, and requires many variables to be controlled for in order to detect an effect. By contrast, the accelerated common law development that occurs at the Federal Circuit may allow the impact of suboptimal practices to be discerned sooner with greater clarity. In some respects, the Federal Circuit is akin to not only a lab animal with a short life cycle but also to an industrial testing machine that wears out or ages a mechanical part or device in an accelerated time frame—such as by repeatedly folding a foldable screen¹²³ or rolling a loaded tire at a high speed for an extended period of time¹²⁴—that allows us to characterize a device's failure points and discern its robustness (or lack thereof).

If we were to take a second look at certain empirical studies of the Federal Circuit through this lens, they might reveal substantial insights about the limitations and weaknesses of certain common practices in appellate decision-making—such as en banc proceedings, sitting by designation, and opinion specialization—that are routinely used throughout the federal courts (in addition to any lessons they provide about the Federal Circuit itself). That is, it is possible that certain effects and phenomena that occur to some degree in all courts may be more clearly discernable in the Federal Circuit dataset because of the "empirical friendly" features discussed in the previous section.¹²⁵ Some examples are provided below.

123. See Engadget, *Samsung Puts Galaxy Fold to the Test*, YOUTUBE (Mar. 28, 2019), <https://www.youtube.com/watch?v=BtJ8I-EPs4Y> [<https://perma.cc/F2JF-EEF9>].

124. See Bill Cobb, *Tire Force Test*, YOUTUBE (Dec. 19, 2007), https://www.youtube.com/watch?v=nmo_dkNZIHM [<https://perma.cc/4TCC-3RFH>].

125. See *supra* Part II.B.1.

a. *Panel Dependence and the Limits of En Banc Review*

The Federal Circuit's experience makes it clear that even a court with a uniformity mandate is susceptible to intractable, persistent intra-circuit conflicts that can lead to panel-dependent adjudication, against which en banc review may be of limited utility.

A key study exploring the dynamics of intra-circuit conflicts within the Federal Circuit is a 2004 study by Professors Polk Wagner and Lee Petherbridge.¹²⁶ Wagner and Petherbridge's analysis of claim construction decisions reveals two key insights: (1) "the composition of the panel that hears and decides an appeal has a statistically significant effect on the claim construction analysis,"¹²⁷ and (2) there exists "a sharp division within the court between two distinct methodological approaches (which we term 'procedural' and 'holistic,' respectively), each of which leads to distinct results."¹²⁸ This study provides a detailed statistical evaluation of the methodological preferences of individual judges,¹²⁹ as well as of any resulting panel dependence in claim construction analyses.¹³⁰

In 2005, the en banc Federal Circuit in *Phillips v. AWH Corp.*¹³¹ attempted to address the methodological split over claim construction by restating the law and clarifying the role of dictionaries in a manner that arguably "makes clear its preference for the open-ended holistic analysis."¹³² However, a follow-up empirical study by Wagner and Petherbridge reveals that the methodological split on claim construction survived *Phillips* with "virtually no change"¹³³: the frequency distribution of the methodologies in use both pre- and post-*Phillips* are "quite similar" and "the observed differences are small and statistically insignificant."¹³⁴ Indeed, after *Phillips*, some Federal Circuit judges have highlighted the need for another en banc sitting to resolve the persistent methodological split.¹³⁵

The two studies by Wagner and Petherbridge demonstrate how methodological splits can persist even after the issuance of an en banc decision addressing that split. Notably, this split was seemingly maintained even when the Federal Circuit judges apparently began to accord greater deference to district court claim construction decisions in the aftermath of the *Phillips* en banc decision, as revealed in a study by Professors Jonas

126. See Wagner & Petherbridge, *supra* note 27.

127. *Id.* at 1112.

128. *Id.* at 1111.

129. See *id.* at 1156–62.

130. See *id.* at 1163–69.

131. 415 F.3d 1303 (Fed. Cir. 2005).

132. R. Polk Wagner & Lee Petherbridge, *Did Phillips Change Anything?: Empirical Analysis of the Federal Circuit's Claim Construction Jurisprudence*, in INTELLECTUAL PROPERTY AND THE COMMON LAW 130 (S. Balganesch ed., 2013).

133. *Id.* at 135.

134. *Id.*

135. See, e.g., *Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 659 F.3d 1369, 1370 (Fed. Cir. 2011) (Moore, J., dissenting from the denial of the petition for rehearing en banc) ("Despite the crucial role that claim construction plays in patent litigation, our rules are still ill-defined and inconsistently applied, even by us.").

Anderson and Peter Menell.¹³⁶ Although the studies by Wagner and Petherbridge as well as by Anderson and Menell use a highly specific dataset—claim construction cases from the Federal Circuit—the lessons they provide are instructive for the rest of the federal judiciary because the adjudicatory processes and practices in use at the Federal Circuit are similar to those employed in the regional circuits, whereby the primary tool for correcting intra-circuit conflicts is sitting en banc.¹³⁷ Moreover, as mentioned previously, the empirical friendliness of the Federal Circuit dataset allows the methodological preferences of each individual judge to be tracked in a statistically rigorous manner to uncover patterns in intra-circuit dynamics.

At the same time, these studies highlight questions about the extent to which the Federal Circuit's failure to resolve its intra-circuit conflicts is due to its specialization or some weakness in the existing rules, practices, and conventions commonly used in multimember appellate courts for managing precedents. Because of the subject-specific case concentration at the Federal Circuit, intra-circuit conflicts can be more readily discerned and emerge sooner than in a regional circuit because the rate of precedent development is effectively sped up. It may be the case, then, that the limits of conventional appellate practices for managing caselaw are reached sooner at the Federal Circuit.

b. Affinity-Based Affirmances

Studying the Federal Circuit can lead to the discovery of some phenomenon that might otherwise be difficult to perceive because of its dispersed, episodic occurrence in the regional circuits. For example, the effects associated with having district judges sit by designation on the courts of appeals can be difficult to systematically analyze in the regional circuits because of differences in case subject matter, panel judges, circuit idiosyncrasies, and other conditions that can vary for each instance when a district judge sits by designation somewhere in the federal court system.

A general question that arises with the practice of sitting by designation is whether it improves adjudication at the trial level and/or at the appellate level. There are many facets to this question, and a study using the Federal Circuit dataset reveals an important behavioral aspect. Specifically, a study by Professors Mark A. Lemley and Shawn Miller reveals the potential existence of affinity-based affirmances, whereby trial judges who have sat by designation at the Federal Circuit are affirmed at higher rates than those who have not—for reasons relating to personal relationships rather than learning effects.¹³⁸ Lemley and Miller looked at the reversal rates for a specific type

136. Anderson & Menell, *supra* note 46, at 59–60 (observing that both holistics and proceduralists changed their voting patterns in similar ways—namely, voting for reversal less often—following *Phillips*).

137. See *supra* notes 72–79 and accompanying text.

138. Mark A. Lemley & Shawn P. Miller, *If You Can't Beat 'Em, Join 'Em?: How Sitting by Designation Affects Judicial Behavior*, 94 TEX. L. REV. 451, 451 (2016).

of task that is commonly performed by district judges in patent cases: the construction of patent claims.¹³⁹ They found that “[a]fter sitting by designation [at the Federal Circuit], the reversal rate of district court judges on subsequent claim construction appeals decreases by over 50%.”¹⁴⁰ According to Lemley and Miller, this improvement may reflect the affinity or rapport between the district judge and the appellate judges that likely developed while the former was sitting by designation at the Federal Circuit—rather than any learning effects from the former’s visit to the appellate court—because the after-designation effect was also present for district judges who did *not* hear claim construction cases while sitting by designation.¹⁴¹

The ability to discern this effect was made possible by a particular dataset that could be assembled due to the Federal Circuit’s specialization and concentration of cases: the district judges were being evaluated on a specific doctrine both before and after sitting by designation with largely the same group of judges, and there was a sufficient number of district judges who, while sitting by designation, could be separated into two groups for comparison—those who heard claim construction cases while sitting by designation and those who did not—in order to filter out any learning effects.

c. *Too Much Opinion Specialization*

For some practices that occur in both the Federal Circuit and the regional circuits, data from the Federal Circuit may provide previews of potential worst-case scenarios that can help inform improvements to adjudicatory operations for the federal appellate courts more generally. That is, instead of siloing the Federal Circuit in a “specialized” bucket and the regional circuits in a “generalist” bucket, another way to think about the federal appellate courts is to put them on a specialization continuum,¹⁴² with the regional circuit that is the “least” specialized (however defined) at one end, the Federal Circuit at the other end, and various regional circuits that hear a disproportionate number of cases in a particular subject area (e.g., the D.C. Circuit and administrative law,¹⁴³ the U.S. Court of Appeals for the Second

139. See *Retractable Techs., Inc.*, 659 F.3d at 1370 (Moore, J., dissenting from the denial of the petition for rehearing en banc) (“Claim construction is the single most important event in the course of a patent litigation. It defines the scope of the property right being enforced, and is often the difference between infringement and non-infringement, or validity and invalidity.”).

140. Lemley & Miller, *supra* note 138, at 451.

141. See *id.* at 473 (“Both judges who heard claim construction cases on appeal and those who didn’t benefitted from the after-designation effect in their subsequent claim construction appeals This suggests that neither substantive learning about claim construction nor even learning what construction opinion are at work . . .”).

142. See Melissa F. Wasserman & Jonathan D. Slack, *Can There Be Too Much Specialization?: Specialization in Specialized Courts*, 115 Nw. U.L. REV. 1405, 1458 (2021) (“[S]pecialization is not binary but lies along a continuum.”).

143. See Michael E. Solimine, *Judicial Stratification and the Reputations of the United States Courts of Appeals*, 32 FLA. ST. U. L. REV. 1331, 1354–55 (2005).

Circuit and securities law,¹⁴⁴ the U.S. Court of Appeals for the Fifth Circuit and immigration law¹⁴⁵) somewhere in between. This is because, in some situations, the differences between the Federal Circuit and the regional circuits may be one of degree when it comes to the impact of certain practices that are commonly used throughout the federal appellate courts.

An example that illustrates this is “opinion specialization,” which is the phenomenon of a judge authoring a disproportionate number of decisions in a particular subject area.¹⁴⁶ Based on an empirical study using only regional circuit data, Professor Edward K. Cheng argues that opinion specialization in generalist courts “can increase expertise while staving off problems such as politicization and tunnel vision,” thereby “captur[ing] many of the benefits of specialized courts without incurring their costs.”¹⁴⁷ At the end of his article, Cheng addresses several potential problems with opinion specialization, which he assures the reader “are not especially acute”¹⁴⁸: variations in the level of expertise from one panel to the next based on whether a specialist judge is present, excessive deference to the specialist judge on the panel, and the introduction of bias by the specialist judge.¹⁴⁹

If we wanted to stress-test opinion specialization to evaluate the extent to which the caveats that Cheng identified might come to fruition, a study of opinion specialization at the Federal Circuit by Professor Melissa F. Wasserman and Jonathan D. Slack is particularly instructive.¹⁵⁰ Based on a dataset of over 4,000 Federal Circuit opinions,¹⁵¹ Wasserman and Slack’s study reveals that some judges author a disproportionate number of patent law opinions, whereas others apparently avoid them.¹⁵² Their study provides detailed analyses for each judge that tracks how their preferences for each subject have evolved over time.¹⁵³ Their results suggest “the feasibility that opinion specialization could lead to doctrine that reflects the idiosyncratic preferences of a few judges.”¹⁵⁴ An example they provide as being potentially suggestive of this possibility is the set of decisions authored by

144. See *U.S. Courts of Appeals Federal Judicial Caseload Statistics tbl.B-7*, U.S. CTS. (Mar. 31, 2022), <https://www.uscourts.gov/statistics/table/b-7/federal-judicial-caseload-statistics/2022/03/31> [<https://perma.cc/U276-L7TS>] (indicating that the Second Circuit handled 33 percent of appeals (33 out of 100) classified as “Securities, Commodities, & Exchanges”).

145. See *id.* (indicating that the Fifth Circuit handled 79 percent of appeals (560 out of 706) classified as “Immigration Offenses”).

146. See Wasserman & Slack, *supra* note 142, at 1407.

147. Cheng, *supra* note 14, at 526. Cheng’s dataset “included all opinions written between 1995 and 2005 in the United States Courts of Appeals for all circuits except the Federal Circuit.” *Id.* at 531.

148. *Id.* at 556.

149. See *id.* at 556–60.

150. Wasserman & Slack, *supra* note 142.

151. See *id.* at 1427.

152. See *id.* at 1440.

153. See *id.* at 1440–45.

154. *Id.* at 1449.

Judge Alan D. Lourie that have substantially impacted how patent law doctrines are applied to biotechnology inventions.¹⁵⁵

Ultimately, Wasserman and Slack conclude that “opinion specialization may be normatively undesirable in specialized courts.”¹⁵⁶ However, they note that “specialization is not binary but lies along a continuum,” and that opinion specialization in regional circuits that hear a disproportionate number of cases on a particular subject “can give rise to similar concerns implicated with specialized tribunals.”¹⁵⁷ Notably, Wasserman and Slack’s chief recommendation for reform—i.e., to move away from the practice of allocating opinion assignment power to the presiding judge—is not one that targets an idiosyncratic feature of the Federal Circuit, but rather a practice in wide use throughout the federal judiciary.¹⁵⁸ In essence, Wasserman and Slack’s study demonstrates how Federal Circuit data can be used to show how a worst-case scenario involving a common phenomenon (opinion specialization) may arise, delve into its mechanics, and inform a solution that can be generally applicable to all federal appellate courts.

The phenomena revealed by empirical studies of the Federal Circuit may enhance our understanding of the federal appellate courts in several ways: it may confirm phenomena or problems theorized to occur in the regional circuits; it may provide an idea of whether a suggested reform might be necessary or adequate; and it may yield alternative ideas for reforms. Being able to prioritize and focus reform proposals is important because acts of Congress are rare and fraught with uncertainty. Much like how animal testing is used to narrow candidate drugs for human clinical trials, what we learn from analyzing the Federal Circuit may help identify those reform ideas that are likely to have a material impact in the rest of the appellate courts. At the same time, by improving the common practices used in the federal appellate courts, the Federal Circuit is likely to be improved as well.

III. IMPLICATIONS AND CAVEATS

A. Generalizability of Studies Using Federal Circuit Data

1. Does the Lack of Inter-circuit Percolation Matter?

Given that percolation in the regional circuits occurs on an inter-circuit basis, some observers might argue that analyzing Federal Circuit data may not reliably tell us much about the potential weaknesses in the practices commonly in use among the federal appellate courts. This raises a question: to what extent would intra-circuit-only percolation be a confounder when evaluating the operational rules, practices, and conventions used in courts subject to inter-circuit percolation? Depending on *what* we are analyzing and

155. *See id.* at 1449–54.

156. *Id.* at 1449.

157. *Id.* at 1458.

158. *See id.* at 1455.

the lessons that we are trying to glean, the lack of inter-circuit percolation may not matter much.

If we are studying certain phenomena that are largely orthogonal to, and/or are unlikely to be materially affected by, inter-circuit percolation, then a study using Federal Circuit data may provide lessons that are likely to be generalizable to the regional circuits. For example, whether judges follow the proper standard of review, are prone to ideological voting, or unconsciously discriminate against certain types of parties, appear to be phenomena where the type of percolation available (inter-circuit vs. intra-circuit-only) might not necessarily be a material factor. By contrast, if we are assessing the normative desirability or “quality” (however defined) of some precedent, then percolation that is limited to intra-circuit occurrences could be a material confounder, depending on the extent to which inter-circuit percolation might influence the thinking of Federal Circuit judges. The extent to which the lack of inter-circuit percolation would affect the generalizability of studies using Federal Circuit data will thus depend on the particular research question explored by the empirical study.

For research questions for which the availability of inter-circuit percolation might, in theory, make a difference, there may still be some instances when analyzing data collected from an intra-circuit-only percolation environment may not necessarily be unrepresentative in studying the regional circuits. Specifically, there may be instances when the availability of inter-circuit percolation is unlikely to materially change the universe of adjudicative possibilities within a given circuit court because there are inherent constraints that can limit the scope and impact of inter-circuit percolation. For example, there may be an “anchoring effect”¹⁵⁹ associated with the decision of the first appellate court to consider an issue: subsequent circuits that consider the issue might be heavily influenced by the analysis of the first appellate court. In addition, some issues may have binary adjudicative options (e.g., “Does a statutory provision allow for punitive damages or not?”), whereby some circuits go one way (“yes”) and the remainder go the other way (“no”), such that percolation is unlikely to yield additional options. Also, the “prior panel rule” may lock a circuit into the position taken by the first panel in that circuit to consider the issue, thereby constraining that court’s ability to dramatically change its position in response to further developments in the other circuits without sitting en banc.

At the same time, *intra*-circuit percolation can yield a variety of adjudicative approaches—particularly for issues that do not pose binary options—depending on the degree to which the issue requires a fact- or case-specific analysis, such as figuring out whether an “inventive concept” exists for purposes of patent eligibility.¹⁶⁰ Also, imperfect adherence to the “prior panel rule” contributes to intra-circuit percolation that can yield

159. See Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 *Sci.* 1124, 1128 (1974).

160. See *Alice Corp. Pty. v. CLS Bank Int’l*, 573 U.S. 208, 221 (2014); *Mayo Collaborative Servs. v. Prometheus Lab’ys, Inc.*, 566 U.S. 66, 72–73 (2012).

intra-circuit conflicts—the prevalence of which is reflected by persistent calls in the literature to reform the en banc process.¹⁶¹

The combined effect of the natural limitations on inter-circuit percolation (e.g., anchoring, binary issues, the “prior panel rule”) and the factors that facilitate intra-circuit percolation (e.g., issues that require case-by-case analyses, imperfect adherence to the “prior panel rule”) may mitigate some of the differences between court systems that have inter-circuit percolation (the regional circuits) and those that do not (the Federal Circuit). Whether the level of mitigation would allow for a meaningful comparison or yield generalizable results would depend on the specific phenomena being studied.

2. The Federal Circuit’s Idiosyncrasies

Some observers may also ask whether the Federal Circuit’s various idiosyncrasies (when compared to the regional circuits) may adversely affect the utility of the Federal Circuit dataset to study phenomena that occur throughout the federal courts of appeals.

For example, the Federal Circuit’s most salient idiosyncrasy is its nongeneralist docket. Whether this may affect the utility of Federal Circuit data for studying operational practices common to the federal appellate courts depends on the particular feature or phenomenon under study. For the purpose of analyzing how judges operate day-to-day and assessing the impact of commonly used practices on the intra-circuit dynamics behind precedent creation, the fact that the regional circuits have generalist dockets would not prevent some studies using Federal Circuit data from being relevant if the phenomenon under study is unlikely to be dependent on the composition of the docket. In some instances, data from the Federal Circuit may need to be properly contextualized in order to glean lessons for the regional circuits; this issue may arise when the differences in the phenomena at the Federal Circuit and those occurring in the regional circuits are largely matters of degree. An example of this is the opinion specialization study that situated the Federal Circuit at one end of a specialization continuum, such that the results from the Federal Circuit could be viewed as a worst-case scenario in relation to the regional circuits.¹⁶²

Other idiosyncrasies concern the nature of the court’s membership. For example, a substantial proportion of the judges on the Federal Circuit have prior experience in patent law.¹⁶³ All of the Federal Circuit judges’ chambers are located in a single courthouse.¹⁶⁴ The judges have a close relationship with the patent bar and are often honored guests at conferences devoted to

161. See, e.g., Sadinsky, *supra* note 86.

162. See *supra* Part II.B.2.c.

163. See *Judge Biographies*, U.S. CT. OF APP. FOR FED. CIR., <https://cafc.uscourts.gov/home/the-court/judges/judge-biographies/> [<https://perma.cc/KMQ9-TQJW>] (last visited Oct. 6, 2023).

164. The Federal Circuit courthouse is located in the District of Columbia. See *Visiting the Court*, U.S. CT. OF APP. FOR FED. CIR., <https://cafc.uscourts.gov/home/information-for/visiting-the-court/> [<https://perma.cc/9GCG-SKLQ>] (last visited Oct. 6, 2023). Its judges are required to live within fifty miles of the District of Columbia. 28 U.S.C. § 44(c).

intellectual property and patent law.¹⁶⁵ To some observers, these personnel characteristics, when combined with a nongeneralist docket, might give the impression that the court could be susceptible to capture and tunnel vision. Regarding capture, there is no definitive answer on this issue, but many observers hold the view that the Federal Circuit has not actually been captured,¹⁶⁶ especially in light of the “presence of strong repeat players on both sides” of patent disputes.¹⁶⁷ As for tunnel vision, which is a risk that arises from a specialized docket,¹⁶⁸ its impact on the generalizability of studies using Federal Circuit data will depend on the nature of the phenomenon being studied.

B. Is the Federal Circuit’s Problem Specialization or Something Else?

We now return to the question: to what extent are the problems with the Federal Circuit attributable to specialization as opposed to certain weaknesses in the day-to-day operational features that are common throughout the federal courts of appeals, which the Federal Circuit’s specialization might reveal more clearly and vividly by virtue of the empirical friendliness of its dataset?

Some of the Federal Circuit’s undesirable tendencies may indeed be attributable to specialization. For example, studies from cognitive psychology suggest that judges who are specialists (or have otherwise acquired expertise after joining the bench) may have more difficulty in recognizing when their precedents need to be reconsidered and may also be more resistant to correction.¹⁶⁹ In addition, “expert” judges on specialized courts may be prone to giving administrative agencies less deference, as observed at the Federal Circuit¹⁷⁰ as well as at the D.C. Circuit,¹⁷¹ which has a de facto specialization in administrative law.¹⁷² Other undesirable tendencies of the Federal Circuit are not strictly grounded in specialization, but rather are common behaviors of appellate judges—such as the aversion

165. See, e.g., *2022 Annual Meeting*, AIPLA, <https://www.aipla.org/detail/journal-issue/2022-annual-meeting> [<https://perma.cc/2KK8-7AK3>] (last visited Oct. 6, 2023) (listing Chief Judge Kimberly A. Moore as keynote speaker); *USD School of Law 10th Annual Patent Law Conference*, UNIV. OF SAN DIEGO: USD NEWS CTR., https://www.sandiego.edu/events/detail.php?_focus=87406 [<https://perma.cc/Z68H-7WLN>] (last visited Oct. 6, 2023) (listing Judge Timothy B. Dyk as keynote speaker).

166. See J. Jonas Anderson, *Reining in a “Renegade” Court: TC Heartland and the Eastern District of Texas*, 39 *CARDOZO L. REV.* 1569, 1616–18 (2018) (surveying the literature).

167. Dreyfuss, *supra* note 7, at 71.

168. See BAUM, *supra* note 33 and accompanying text.

169. See Bock, *supra* note 49, at 214–17.

170. See Sapna Kumar, *Expert Court, Expert Agency*, 44 *U.C. DAVIS L. REV.* 1547, 1550 (2011) (“The Federal Circuit treats appeals from patent agencies differently than those from non-patent agencies [T]he Federal Circuit has historically chosen not to defer to agencies on issues of patent law.”).

171. See Richard J. Pierce, Jr., *What Do the Studies of Judicial Review of Agency Actions Mean?*, 63 *ADMIN. L. REV.* 77, 90 (2011).

172. See Solimine, *supra* note 143 and accompanying text.

to sitting en banc to resolve intra-circuit splits¹⁷³—whose negative effects may be amplified by the Federal Circuit's nationwide exclusive jurisdiction.

However, because the Federal Circuit's most salient characteristic is its specialized jurisdiction, "specialization" may be the culprit that most readily comes to mind for the court's critics, rather than any weaknesses in the practices commonly in use throughout the federal appellate judiciary. This reaction is understandable because, as this Article has argued, the weaknesses of the common practices may not be as readily observable in the regional circuits.¹⁷⁴ However, at the Federal Circuit, with its accelerated pace of precedent development, the common practices are effectively stress-tested, such that their limitations (and failures) are likely to be revealed more clearly and vividly, as well as be discerned with greater statistical reliability.¹⁷⁵

If the empirical studies of the Federal Circuit provide any overarching lesson, it is that certain operational features that are common at the federal appellate level may be inadequate for that court. What the Federal Circuit might need are industrial-strength versions of certain common practices, as well as new practices tailored to the quirks of its specialized jurisdiction. The existing practices may not have adequate safeguards to handle the rapid pace at which the Federal Circuit's precedents undergo intra-circuit percolation to reach some steady state which, in some instances, could be an intra-circuit split that yields panel-dependent outcomes (e.g., patent eligibility,¹⁷⁶ claim construction¹⁷⁷). Because the concentration of cases due to the court's exclusive jurisdiction has the effect of speeding up the precedent-development timeline, it would be helpful to have a mechanism for slowing it down or lengthening the window of precedent development to allow for more opportunities for intra-circuit percolation that may lead to rethinking and reconsideration of precedents in light of changed circumstances and new information.

When considering ways to stretch out the period of precedent development on a specialized court, it might be helpful to look at the regional circuits, where precedent development in a given area of the law arguably occurs on a slower timescale than the Federal Circuit due to the combination of a generalist docket and the dispersal of cases among multiple circuits. Aside from the existence of circuit splits, a decentralized, generalist docket can have the *effect* of slowing down progress toward a steady state due to the occurrence of certain temporal artifacts that I call "temporal distance" and "temporal diffusion," which might help create conditions that promote rethinking of existing precedent, as described below.

Temporal Distance. In the regional circuits, the distribution of cases across multiple circuits creates a situation in which the average regional

173. See *supra* notes 74–79 and accompanying text.

174. See *supra* Part II.A–B.

175. See *supra* Part II.

176. See, e.g., *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 966 F.3d 1347 (Fed. Cir. 2020) (revealing 6-6 split).

177. See *supra* Part II.B.2.a.

circuit judge may write an opinion applying some doctrine and then not write another opinion applying the same doctrine for some time—possibly months or even years. This “temporal distance” between successive opinions by a judge that addresses the same doctrine has benefits similar to setting aside a project and returning to it later with a fresher mind. When the regional circuit judge encounters a subsequent opportunity to write an opinion involving the same doctrine, that judge will likely need to relearn the applicable law. Although relearning might be inefficient, it provides an opportunity for rethinking, especially if there are intervening events that make it clear that the doctrine may need to be updated. By contrast, at the Federal Circuit, the concentration of patent cases allows its judges to regularly apply a certain set of doctrines, which obviates the need for relearning. However, this lack of temporal distance at the Federal Circuit may not be giving its judges an adequate opportunity to take a step back and rethink.

Temporal Diffusion. In the regional circuits, the fact that cases are distributed over a larger number of judges across multiple circuits may slow the pace at which a steady state is reached on some doctrine because a greater number of judges—and hence a greater variety of views—may contribute to the development of precedents in a particular area of the law. This slowed pace of common law development might be self-sustaining: the percolation window may be drawn out due to constant changes in the composition of the regional circuits (some judge in some circuit is either new, taking senior status, or retiring), such that the process of inter-circuit percolation is replenished with the views of new judges, which can spur rethinking. At the Federal Circuit, the concentration of cases creates a scenario in which many iterations of applying a particular doctrine can occur during a relatively short period of time when there is little to no change in court membership, such that the views of all of its judges have likely matured or crystallized. Also, the relative stability in membership at the Federal Circuit, along with opinion assignment rules that depend on seniority, may further depress the likelihood of precedents being reconsidered.

These two temporal artifacts—temporal distance and temporal diffusion—could be substantial contributors to certain positive qualities (e.g., not being susceptible to tunnel vision, a willingness to update precedents, being less formalistic, etc.) that are seemingly attributed to generalist courts indirectly through criticisms of the Federal Circuit’s specialization.¹⁷⁸ The challenge, then, is figuring out how to recreate these temporal artifacts on a smaller scale at the Federal Circuit to slow down or lengthen the period of intra-circuit percolation, so as to create the conditions under which its judges are more likely to rethink or revisit precedents as circumstances warrant.

In the regional circuits, these beneficial temporal artifacts are basically the byproducts of dispersing cases among multiple circuits with generalist dockets and tolerating inter-circuit conflicts. If we want to create greater temporal distance and temporal diffusion while still having a single appellate

178. See *supra* Part I.A.

court for patent appeals, one way to do so would be to introduce regular rotations of the Federal Circuit's membership, as well as to adopt an alternative to the "prior panel rule" to better facilitate percolation at that court. These and other ideas for reforming the Federal Circuit are explored in greater detail in the next section.

C. Ideas for Reforms

If we want to fix how precedents are created and managed at the Federal Circuit, we can (1) update the relevant rules and statutes that underlie certain commonly used practices in the federal courts of appeals and/or (2) provide the Federal Circuit with custom tools that can withstand heavy-duty use in the crucible of accelerated doctrinal development. There are several items that may be in need of reform.

One major weakness of existing practices is that the "usual suspects" (i.e., the same few judges), whether due to seniority and/or perceived expertise, exert a disproportionate influence on the body of precedents, which is then amplified by the "prior panel rule" and the difficulty of sitting en banc. This is further aggravated by behavioral and situational factors that militate against change because reconsidering and correcting precedents often entails extra work for judges.¹⁷⁹

Accordingly, one "big picture" reform for the Federal Circuit might be to tweak its operations so that a greater variety of judges have the opportunity to meaningfully shape the law. This could help lengthen the period of intra-circuit percolation (as discussed in the previous section).¹⁸⁰

For example, existing practices for allocating power to judges in the operational aspects of adjudication could be changed so that they are no longer dependent on seniority. Along these lines, the selection of the presiding judge on a panel or the assignment of opinion-authoring duties could be randomized.

Furthermore, procedures for designating decisions as (non)precedential, invoking en banc rehearings, and handling intra-circuit splits could be changed so as to mitigate the outsized influence of the first panel to consider the issue under the "prior panel rule." Indeed, perhaps the "prior panel rule" itself should be reconsidered.¹⁸¹

Finally, to facilitate periodic introduction of new perspectives, it would be advisable to implement some mechanism for encouraging turnover or imposing term limits at the Federal Circuit, such as by staffing the court with district judges who serve staggered terms of limited duration¹⁸² or some other rotation scheme involving regional circuit judges.

With respect to any proposals that would facilitate or increase the probability of change (in precedents, in personnel, or both), some might raise

179. See Bock, *supra* note 49, at 219–27.

180. See *supra* Part III.B.

181. See Kannan, *supra* note 81, at 765–66.

182. See, e.g., Bock, *supra* note 49, at 204–05 (proposing staffing the Federal Circuit with district judges who serve staggered, rotating terms).

concerns about the stability of precedent and the potential for doctrinal whiplash.¹⁸³ For the regional circuits, it is possible that the cost of some of the proposed reforms might outweigh their benefits for this reason. However, for the Federal Circuit, the benefits from reforms that facilitate reconsideration of precedent and mitigate lock-in are likely to outweigh their costs because of the accelerated pace at which percolation occurs to reach a (potentially suboptimal) steady state. At a regional circuit, the combination of life tenure, the “prior panel rule,” the difficulty of sitting en banc, the strong influence of seniority in opinion assignments, and the behavioral and situational factors that make it easy for judges to simply go along rather than work through their disagreements (or even dissent), can create a self-reinforcing “lock-in effect” in precedent development that can be problematic. At the Federal Circuit, this problematic effect may be more pronounced because of the accelerated pace of percolation due to the concentration of cases and the nationwide footprint of the court’s decisions.

If we want to test reforms that may potentially change this dynamic, the Federal Circuit would be a good place to start because its rapid pace of common law development not only heightens its need for reform but also may reveal more quickly (than in the regional circuits) whether a proposed reform is likely to work. Indeed, the Federal Circuit can serve as a sandbox for Congress or the Judicial Conference to stress-test or experiment with new rules or reforms before rolling them out to the regional circuits. It may be easier for experimentation to occur at the Federal Circuit precisely because of its relative jurisdictional isolation from the other courts of appeals. That is, a proposed change to the operation of the federal appellate courts can be tested at the Federal Circuit without materially affecting the regional circuits.¹⁸⁴ By “road testing” a change in one circuit, multiple circuits can be spared from implementing unproven reforms that may be costly (in terms of time and resources) to implement.

CONCLUSION

The existing literature on the Federal Circuit has looked at the court largely from a single perspective: whether a specialized court is living up to its promise as a responsible steward of decisional patent law. From this perspective, a variety of theoretical, doctrinal, and empirical studies arguably show that certain aspects of the Federal Circuit’s performance and practices are problematic or suboptimal and conclude that specialization is to blame. But there is a potential confounder that has not been adequately accounted for: the weaknesses in the day-to-day practices that the Federal Circuit uses

183. See generally Christopher Sundby & Suzanna Sherry, *Term Limits and Turmoil: Roe v. Wade’s Whiplash*, 98 TEX. L. REV. 121 (2019) (studying the effect of term limits on the stability of Supreme Court precedent).

184. See generally Jeremy W. Bock, *Deconfounding and Sandboxing Patent Litigation with a Specialized Patent Trial Court*, 80 MD. L. REV. 1137 (2021) (discussing the sandboxing function of a specialized court); see also Lisa Larrimore Ouellette, *Patent Experimentalism*, 101 VA. L. REV. 65 (2015) (examining other models of experimentation in the context of the patent system).

that are also commonly in use throughout the federal courts of appeals. Because of the Federal Circuit's specialization, we get a concentration of cases that creates conditions for a de facto "stress test" of many of the basic operational practices involved in judicial decision-making. The Federal Circuit has been using largely the same toolbox of common practices that are in use throughout the federal appellate courts, and it may not be enough.