Understanding the Federal Circuit: A Model of Expert Decision-making

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ABSTRACT

The Federal Circuit—the appeals court in charge of virtually all patent cases—has been fraught with controversy since its creation. To its critics, the Federal Circuit engages in puzzling behaviors, out of step with its role as an Article III appellate court. The Federal Circuit shows little deference to District Courts on questions of fact and to the Patent and Trademark Office on technical issues. It surprisingly resorts to formalistic rules in an area of the law that requires flexibility to adapt to changing technological landscapes. These criticisms have become increasingly salient, leading to calls for an end to the Federal Circuit's exclusive jurisdiction over patent law. Its supporters, while acknowledging the Federal Circuit's distinctive behavior, defend its exclusive jurisdiction as ensuring efficient, accurate, and uniform decisions in a technically complex area. Several explanations have been put forth to account for these puzzling behaviors. Yet, none can fully explain the range of unique Federal Circuit conduct. Without a full explanation for Federal Circuit behavior, however, the debate over Federal Circuit jurisdiction will remain gridlocked.

Drawing upon studies from the sociology of expertise, this Article is the first to provide a model of Federal Circuit decision-making that unifies these fragmented critiques by explaining Federal Circuit behavior as a product of predictable expert community dynamics. The Article unpacks the behavior of the Federal Circuit into five distinct features not previously identified: (1) epistemological monopoly; (2) epistemological autonomy; (3) codification; (4) typecasting; and (5) inability to self-coordinate. Expert communities' drive for epistemological control and autonomy means they are less likely to defer to solutions proposed by other expert communities, such as the PTO, than would be expected of generalist courts. It also implies that expert communities are more likely to defy non-expert superior generalists, such as the Supreme Court, than predicted by traditional accounts of judicial behavior. The model also explains the Federal Circuit's resort to rule formalism as a function of an expert community's drive to codify its knowledge base to control subordinate communities, build legitimacy, and manage internal dissent. Normatively, this model offers a path out of the gridlock by revealing a framework to evaluate and design proposals for Federal Circuit reform.

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INTRODUCTION

Patent law has transitioned from an arcane topic[1] to a field that is increasingly forced to confront some of the thorniest issues of national public policy, such as the patentability of genes,[2] diagnostic methods,[3] and synthetic biology.[4] As patent law captures national headlines,[5] commentators have placed renewed focus on the workings of the U.S. Court of Appeals for the Federal Circuit (the "Federal Circuit")—the single appeals court in charge of virtually all patent cases.[6]

The Federal Circuit's patent jurisprudence has come under sustained criticism. Commentators rue the Federal Circuit's increasing preference for simple rules over standards;[7] its unwillingness to defer to the District Court's and the Patent and Trademark Office's (PTO) findings of fact[8] or to

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[1] *See, e.g.*, ADAM B. JAFFE & JOSH LERNER, INNOVATION AND ITS DISCONTENTS 9 (2004) (arguing that the Supreme Court rarely heard patent cases before 1982 because "[t]he justices were reluctant to devote their time to these 'banal' commercial disputes."); Craig Allen Nard, *Deference, Defiance, and the Useful Arts,* 56 OHIO ST. L. J. 1415, 1417 (1995)) (noting in 1995 that academics pay scant attention to patent law, and characterizing the patent system as "highly specialized" and "esoteric.").

[2] *See, e.g.,* Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 133 S. Ct. 2107, 2111 (U.S. 2013) (holding that isolated genomic DNA is patent ineligible); Ass'n Molec. Pathol. v. Myriad Genetics, Inc., 689 F.3d 1303, 1325 (2012) (holding that isolated DNA molecules are patentable subject matter) (reversed).

[3] *See, e.g.,* U.S. Mayo Collaborative Servs. v. Prometheus Labs., Inc., 132 S. Ct. 1289, 1294 (U.S. 2012) (holding that a diagnostic method that helped doctors determine the appropriate dose of a thiopurine drug was an unpatentable law of nature).

[4] *See generally,* Sapna Kumar & Arti Rai, *Synthetic Biology: The Intellectual Property Puzzle*, 85 TEX. L. REV. 1745 (2007).

[5] *See, e.g.,* Charles Duhigg & Steve Lohr, *The Patent, Used as a Sword*, N.Y. TIMES, Oct. 7, 2012, *available at* http://www.nytimes.com/2012/10/08/technology/patent-wars-among-tech-giants-can-stifle-competition.html; Editorial*, Clarifying, and Tightening, Patent Law*, N.Y. TIMES, June 4, 2014, *available at* http://www.nytimes.com/2014/06/05/opinion/clarifying-and-tightening-patent-law.html; Adam Liptak, *Justices, 9-0, Bar Patenting Human Genes*, N.Y. TIMES, June 13, 2013, *available at* http://www.nytimes.com/2013/06/14/us/supreme-court-rules-human-genes-may-not-be-patented.html; Adam Liptak, *Two Rulings May Curb Lawsuits Over Patents*, N.Y. TIMES, Apr. 29, 2014, *available at* http://www.nytimes.com/2014/04/30/business/two-rulings-may-curb-lawsuits-over-patents.html; *Take Back Your Genes*, American Civil Liberties Union, https://www.aclu.org/take-back-your-genes (last visited July 8, 2014).

[6] *See, e.g.* Hon. Diane Wood, Keynote Address: Is It Time to Abolish The Federal Circuit's Exclusive Jurisdiction in Patent Cases? 13 CHI.-KENT J. OF INTELLECTUAL PROP. (2013). (arguing that the Federal Circuit's exclusive jurisdiction over patent cases should be abolished).

[7] *See, e.g.,* John R. Thomas, *Formalism at the Federal Circuit*, 52 AM. U. L. REV. 771, 777 (2003).

[8] *See, e.g.*, Ted D. Lee & Michelle Evans, *The Charade: Trying a Patent Case to All "Three" Juries*, 8 TEX. INTELL. PROP. L.J. 1, 14 (1999) ("When the Federal Circuit believes the jury verdict was wrong, it substitutes its opinion for that of the jury and simply states that the substantial evidence test was not met."); Arti Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. (2003) ("The court has subjected trial court fact finding in infringement or declaratory judgment actions to a level of review that is contrary to traditional principles of appellate review.").

decisions by the International Trade Commission (ITC);[9] its propensity for *de novo* review;[10] and its overly expansive view of its own jurisdiction.[11] Taken together, critics argue, these features have given rise to a court that is unresponsive to the needs of communities of innovators and out of step with national innovation policy.[12] For example, John Thomas links what he terms the Federal Circuit's "adjudicative rule formalism" to the court's inability to adjust patent law to the changing conditions of technological innovation.[13] Arti Rai characterizes the court's aggressive *de novo* review as "having problematic effects across entire fields of technology."[14] And Sapna Kumar is critical of the Federal Circuit's unwillingness to defer to the ITC's patent decisions, in view of the ITC's greater political accountability and fact-finding capability.[15] In part echoing these critiques, Chief Judge Diane Wood recently proposed that we eliminate the Federal Circuit's exclusive jurisdiction over patent law.[16] Judge Wood cautioned against specialized tribunals, emphasizing that no area of the law should "be an arcane preserve for specialists, who never emerge to explain, even to their clients, what the rules are or why one side or the other prevailed."[17]

These critiques are particularly troubling, as they flatly contradict a crucial assumption underlying the creation of the Federal Circuit: that placing the "unusually complex [and] technically difficult"[18] patent cases in the hands of a single appeals court would lead not only to national uniformity but also to better quality patent decisions.[19] Thus, explaining these particular features of Federal Circuit jurisprudence is important both to provide a diagnosis of the current "patent failure"[20] and to design a way out.

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[9] *See, e.g.*, Sapna Kumar, *Expert Court, Expert Agency*, 44 U.C. DAVIS L. REV. 1547, 1550-1551 (2011); Nard, *supra* note ___, at 142; Arti Rai, *Addressing the Patent Gold Rush: The Role of Deference to PTO Patent Denials*, 2 WASH. U. J. L. & POL'Y 199, 201 (2000); Rai, *supra* [Engaging] note ___, at 1052-56.

[10] Rai, *supra* [Engaging] note ___, at 1052 (arguing that the Federal Circuit has effectively applied a *de novo* standard of review to disputes regarding nonobviousness and disclosure standards, and has "refuse[d] to recognize the existence of factual disputes" in claim construction).

[11] *See, e.g.*, Paul Gugliuzza, *Patent Law Federalism*, 2014 WIS. L. REV. 11, 30 (2014) (noting that "[t]he Federal Circuit has also embraced a broad view of the types of state law claims subject to exclusive federal patent jurisdiction").

[12] *See, e.g.,* Rai, *supra* [Engaging] note ___, at 1053.

[13] Thomas, *supra* note ___, at 775 ("We can imagine a patent law as dynamic as the innovative industries it is said to support, but an orientation towards rules threatens to make the patent law hidebound and unresponsive to changing conditions.").

[14] Rai, *supra* [Engaging] note ___, at 1065. Rai also argues that the Federal Circuit does not have the requisite familiarity with the "factual particulars of any given technology" to be well-equipped for *de novo* review. *Id.*

[15] Kumar, *supra* note ___at

[16] Wood, *supra* note ___ at

[17] *Id.* at 7.

[18] H.R. Rep. No. 97-312, at 22-23 (1981).

[19] *Id.*

[20] *See* JAMES BESSEN & MICHAEL MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (2008).

One explanation for some of these peculiar features of the Federal Circuit has figured prominently in recent debates: the court's institutional position as a centralized decision-maker. In this account, the absence of inter-circuit competition and diversity in the development of patent law has prevented the kind of experimentation that leads to incremental legal innovation in other areas of the law.[21] The solution is a more decentralized appeals system "allowing for multiple courts to experiment with various judicial viewpoints and debate new and existing ideas."[22] Critics of decentralization, on the other hand, warn that it would represent a throwback to the pre-Federal Circuit days of rampant forum-shopping.[23] Moreover, they predict that circuit splits would lead to uncertainty regarding patent rights and impose large economic costs on innovators, who are almost invariably multi-circuit actors.[24]

The problem with the centralization/decentralization debate is that it is very hard to assess the "optimal" amount of decentralization for any given institution. Indeed, judgments of whether centralizing patent cases in a single appeals court versus decentralizing them among multiple circuits is preferable depend in large part on a priori assumptions or intuitions about the costs of circuit splits for innovative industries versus the advantages of policy variation.[25]

Centralization also provides an incomplete explanation for the features of the Federal Circuit described above.[26] For example, there is nothing inherent in the concept of centralization that predicts the observed low-level of deference to institutions that have a considerable level of expertise in patent law issues, such as the PTO and the ITC.[27] This low level of deference has

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[21] *See, e.g.,* Craig Allen Nard & John F. Duffy, *Rethinking Patent Law's Uniformity Principle*, 101 NW. U. L. REV. 1619, 1649 (2007) ("Without the benefits of competition and diversity, the Federal Circuit is isolated from noteworthy doctrinal proposals and normative prescriptions that would be generated by other circuit courts"); Wood, *supra* note ___ ("[C]ircuit splits and disagreements with colleagues force judges to sharpen their writing, push them to defend their positions, and from time to time persuade them that someone else's perspective is preferable. This process of testing and experimentation is lost when uniformity is privileged above all values.").

[22] *Id. See also*, Rai, *supra* [Engaging] note ___, at 1135 (calling for "greater generalist input in the appellate process.").

[23] *See, e.g.,* Rochelle C. Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1, 7 (1989); Paul Gugliuzza, *Rethinking Federal Circuit Jurisdiction*, 100 GEO. L.J. 1437, 1448 (2012); Rai, *supra* [Engaging] note ___, at 1124; Rai, *supra* [Gold Rush] note ___, at 207 n.21; Edward Reines, *In Defense of the Federal Circuit: A Response to Judge Wood*, The Litigation Daily, Oct. 7, 2013; *cf.* Arti Rai & Stuart Minor Benjamin, *Fixing Innovation Policy: A Structural Perspective*, 77 GEO. WASH. L. REV. 1, 24 (2008) (arguing that splitting administrative patent reviews between the PTO and the ITC leads to forum shopping).

[24] *Id.*

[25] *Cf.* Wood *supra* note ___ at *with* Reines *supra* note ____ at

[26] *See infra* Part I.B. Proponents of decentralization do not necessarily propose centralization as a general explanatory framework for Federal Circuit behavior, but rather as an undesirable feature of the court. *See, e.g.,* Duffy & Nard *supra* note ___ at; Wood *supra* note ___ at

[27] *See also infra* Part ___.

arguably done much to undermine the predictability and uniformity of patent law.[28]

It is certainly the case that centralization cannot guarantee high-quality decisions, and may even undermine quality by eschewing flexibility and the ability to adapt to changing technical environments in favor of predictability.[29] Yet, it is not clear that centralization itself is directly linked to inflexible, low-quality decisions. A key question is: can there be high-quality centralized decision-making in patent law that preserves the values of predictability and uniformity while simultaneously responding to the changing needs of complex technical environments? I believe the answer is "yes." But to fully answer this question, it is imperative to begin by understanding the dynamics of Federal Circuit decision-making. This Article argues that to do so requires understanding expert institutions, including their blind spots and strengths.[30]

The concept of expertise in techno-legal questions[31] has been inadequately studied and theorized both in legislative and in academic debate.[32] The legislative history of the Federal Circuit Act shows that Congress created the Federal Circuit at least in part to increase expertise in patent cases.[33] At the same time, Congress also considered the costs of

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[28] *See infra* Part ____.

[29] When speaking of the "quality" of judicial decision-making, these academic commentators and others adopt Rochelle Dreyfuss apt definition: "whether the law … is … responsive to the philosophy of the Patent Act, to nationalcompetition policies, and to the needs of researchers and technology users." Dreyfuss, *supra* [Fed. Cir. Case Study] note ___, at 5.

[30] *See, e.g.,* Matthew J. Gabel & Charles R. Shipan, *A Social Choice Approach to Expert Consensus Panels*, 23 J. HEALTH ECON. 543 (2004) (concluding that "to maximize the chance of an accurate decision" expert panels in medicine should decrease interdependence among participants, and eliminate "the goal of reaching consensus").

[31] The term "techno-legal questions" denotes those issues at the intersection of law and scientific disciplines, whose resolution requires understanding *both* the scientific principles behind a particular legal issue (such as whether to grant or deny a patent or, in environmental law, whether to declare a particular species "endangered") and the legal rules and standards that have developed to address it. *See, e.g.,* M. LYNNE CORN, KRISTINA ALEXANDER & EUGENE H. BUCK, CONG. RES. SERVICE, THE ENDANGERED SPECIES ACT AND "SOUND SCIENCE" (2013) ("The scientific underpinnings of decisions under the ESA are especially important, given their importance for species and their possible impacts on land use and development.").

[32] Legislative debates and committee reports emphasize: (1) "increased uniformity;" (2) "reduction of congestion in the judiciary;" and (3) "increased efficiency and reliability of decisions" as the main drivers and justification for the creation of the Federal Circuit. 97 H.R. Rep. No. 97-312, at 23 (1981).

[33] *See, e.g.,* S. Rep. No. 97-275, at 6 (1981) (noting that the Federal Circuit Act is "a sensible accommodation of the usual preference for generalist judges and the selective benefit of expertise in highly specialized and technical areas"); H.R. Rep. 97-312, at 22-23(1981) ("Directing patent appeals to the new court will have the beneficial effect of removing these unusually complex, technically difficult, and time-consuming cases from the dockets of the regional courts of appeals.").

judicial specialization[34] and attempted to mitigate them.[35] Both Congress and most academic commentators, however, focus almost exclusively on two features of a specialized judiciary that are thought to represent the dark side of specialization or expertise—"capture" and "tunnel vision."[36] These two features, however, provide only a limited and incomplete description of the behavior of expert decision-making bodies.[37]

This article fills this gap in the literature by refocusing the specialization debate on the role, possibilities and limitations of decision-making by an expert institution. Drawing from and expanding upon studies in the sociology of expertise, this Article is the first to provide a model that explains Federal Circuit behavior as flowing from expert community dynamics. An "expert community," as the term is used here, refers to institutionalized groups of experts that develop and apply a system of abstract knowledge to address a specific set of questions. For example, psychologists have developed a system of abstract knowledge—partially codified in the Diagnostic and Statistical Manual of Mental Disorders (DSM)—to diagnose and treat mental illness.[38] Patent law contains its own system of abstract knowledge—a system to identify and categorize what inventions require a patent to incentivize innovation, and designed to ultimately foster the "progress of science and the useful arts."[39] I develop the concept of "expert community" throughout this article. A key claim is that there are important differences between how experts and non-expert generalists will decide cases and interact with other relevant actors—and in particular with other

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[34] Specialization and expertise are related concepts. Specialized courts typically have jurisdiction over a narrow type of cases (such as those involving patent, bankruptcy or tax issues). *See, e.g.,* LAWRENCE BAUM, SPECIALIZING THE COURTS (2011). Because judges in specialized courts are exposed to a larger concentration of cases dealing with specific issues, even if they do not join the bench with prior training in that particular subject area, they are expected to develop a type of expertise through that repeated and concentrated exposure. Indeed, the Federal Circuit itself considers its exposure to a large volume of patent cases to confer upon it "useful expertise" in patent law. *Highmark* (denial of reharing en banc) at ___. The two concepts, however, are not identical, and this article engages with crucial differences in Section ___.

[35] *See, e.g.,* S. Rep. 97-275, at 6 (1981) (describing the "imperative of avoiding undue specialization within the Federal Judicial system"); *id.* (noting that the court's "varied docket spanning a broad range of legal issues and types of cases" would "assure[] that the work of the proposed court will be broad and diverse and not narrowly specialized.")

[36] *See infra* Part I.B.3 note ___ (citing sources).

[37] *See infra* Part ___. Capture is overinclusive, as it describes behavior linked both to centralization and specialization. Crucially, although the Federal Circuit has long been viewed as a pro-patent court, many of its decisions have limited the scope of patent grants, thus undercutting the explanatory power of capture theory. Tunnel vision is an ambiguous concept, as it hides multiple mechanisms by which expert decision-making can influence the content of judicial decisions. For example, tunnel vision may refer to the professional biases of patent lawyers towards regarding patents as valid; or tunnel vision may also refer to the insight that judges who are experts in patent law may be unable to fully grasp and consider the impact of their decisions on other fields of law, notably competition law.

[38] *See*, AM. PSYCHIATRIC ASS'N, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS (5th ed. 2013).

[39] U.S. Const. art. I, §8, cl. 8.

institutional actors such as agencies, district courts, other appellate courts, and the Supreme Court. Appreciating these differences is crucial to understanding the behavior of specialized courts.

Sociologists have long been interested in understanding the development, organization and control of expertise in society. This paper draws from two lines of sociological research. The first explores how expertise is institutionalized in organized groups of experts and how those organized groups interact with each other and with society at large.[40] The second focuses on understanding the role of codified knowledge (usually in the form of explicit rules of action) and tacit knowledge (*i.e.* not codified contextual knowledge) in expert decision-making.[41]

Two basic insights emerge from these studies. First, organized groups of experts seek maximal control and autonomy in the development and application of the abstract knowledge base that constitutes their expertise.[42] But expert groups are embedded in an ecosystem composed of other expert groups with different knowledge systems that apply to overlapping sets of problems.[43] This overlap leads expert communities to engage in constant competition with each other for jurisdictional control.[44] As applied to the Federal Circuit, this unappreciated dynamic of jurisdictional competition between expert communities can explain the Federal Circuit's rigorous, non-deferential standard of review of PTO decisions—a behavior that stands in sharp contrast with the behavior of non-expert appellate courts.[45] In addition, an expert community's struggle to maintain autonomy in the development of its knowledge base, predicts that expert communities will be more likely to defy solutions imposed by non-expert generalists than are communities of non-experts.[46] More specifically, it predicts that the Federal Circuit is more likely to defy Supreme Court decisions than are other circuit courts.[47]

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[40] *See, e.g.,* ANDREW ABBOTT, THE SYSTEM OF PROFESSIONS (1988); Elizabeth H. Gorman & Rebecca L. Sandefur, *"Golden Age," Quiescence, and Revival: How the Sociology of Professions Became the Study of Knowledge-Based Work*, 38 WORK & OCCUPATIONS 375 (2011); *see also infra* Section II.A.

[41] *See, e.g.,* THEODORE PORTER, TRUST IN NUMBERS (1995); HARRY COLLINS & ROBERT EVANS, RETHINKING EXPERTISE (2007); Robin Cowan, *Expert systems: aspects of and limitations to the codifiability of knowledge*, 30 RES. POL. 1355, 1356 (2001); *see also infra* Section II.B.

[42] *See infra* Section II.A.1.

[43] *See Id.*

[44] *See infra* Section II.A.2.

[45] *See infra* Section ___. *See* Banks Miller and Brett Curry, *Experts Judging Experts*: *The Role of Expertise in Reviewing Agency Decision Making*, 38 LAW & SOCIAL INQUIRY 55, 55-56 (2013) ("In general, both theoretically and empirically, students of court-agency interactions have noted that courts are highly deferential to the decision making of federal agencies.").

[46] *See infra* Section ___.

[47] There have been no quantitative empirical studies comparing Federal Circuit defiance of Supreme Court decisions to defiance by other circuits, or assessing whether the Federal Circuit is more likely to defy the Supreme Court in its perceived area of expertise (patent law) than in any of the other cases that make up its docket—both of which are predicted by this model. But qualitative evidence suggests this is indeed the case. *See infra* Section ___.

Second, expert practitioners differ from novices in their relationship to the use of *rules* to solve problems.[48] Novices must self-consciously follow explicit rules to begin their path towards expertise.[49] In contrast, experts can draw on a wealth of contextual information gathered through training and practice that is not readily reduced to a set of written rules of decision (or what is often termed "tacit knowledge.").[50] A direct consequence of expert tacit knowledge is an unavoidable conflict between the rules as explained to novices and their actual application by experts to real-world conflicts. But rules serve two additional functions. Because rules prevent recourse to more subjective contextual judgment, expert communities often resort to rules to constrain and control the action of subordinate communities.[51] Finally, rules also serve a legitimating function by showing non-expert novices and the public at large the utility of the expert practice, and by reducing variability in expert communities with high levels of internal dissent.[52]

Taken together, these studies present a more nuanced picture of the multiple reasons why an expert community resorts to rules. Specifically, they explain rule formalism at the Federal Circuit as a mechanism to: (1) constrain subordinate expert communities, such as the PTO, (2) both teach and constrain the actions of District Courts (conceptualized as subordinate generalist communities), (3) legitimize Federal Circuit expertise in the eyes of relevant audiences (such as the patent bar, scientists, academics, and the Supreme Court), and (4) manage internal dissent.[53] An expert community's resort to rules, however, can also lead to an apparent double standard. Rules that bind District Courts also bind the Federal Circuit and prevent it from deploying its "tacit knowledge" or "expertise." To solve this paradox, we would expect an expert community to look for ways to free itself from the very same rules it created, in order to deploy its expertise. Indeed this Article shows how this prediction is borne out by Federal Circuit behavior.[54]

This article makes three important contributions. First, it develops a thorough and systematic typology of expert community features that the sociology literature has not provided. These features allow for a more complete, sharper and more nuanced understanding of the behavior of specialized courts than previous analyses focused largely on the enhanced likelihood of capture by special interests, and on the fuzzy concepts of "narrowness" or "tunnel vision." In turn, a better understanding of the behavior of specialized courts can be used to improve their institutional design. Second, this model of expert decision-making sheds light on the Federal Circuit's unique relationships with other players in the judicial hierarchy, including the PTO, District Courts, and the Supreme Court.

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[48] *See infra* Section ___.
[49] *See infra* Section ___.
[50] *See infra* Section ___.
[51] *See infra* Section ___.
[52] *See infra* Section ___.
[53] *See infra* Section ___.
[54] *See infra* Section ___.

Finally, it also supplements existing principal-agent models that seek to explain the relationship between higher and lower courts, by showing why expert courts are likely to deviate from those models' predictions.[55]

The remainder of the Article proceeds in four parts. Part I offers an overview of the critiques surrounding the performance of the Federal Circuit, as well as existing explanations for its behavior. Part II introduces the reader to studies in the sociology of expertise. Drawing and expanding upon these studies, Part II also develops a typology of five features that are closely associated with communities with attributed expertise in a particular subject matter: (1) epistemological monopoly; (2) epistemological autonomy; (3) codification; (4) typecasting; and (5) inability to self-coordinate. This part demonstrates how conceptualizing the Federal Circuit as an expert community helps explain key features of its jurisprudence—rule formalism, defiance of Supreme Court precedent, lack of deference to District Court findings of fact, and jurisdictional expansion.

Part III develops the normative implications of an "expert community" analysis of the Federal Circuit. It argues that two features of expert communities: typecasting and inability to self-coordinate are normatively undesirable in a centralized specialized court. To minimize the distortive effects of typecasting in the context of a centralized court, this Article proposes the use of advisory panels to house technological and economic expertise, a strategy that is widely used to optimize medical decision-making.

I. THE FEDERAL CIRCUIT UNDER FIRE: THE INSTITUTIONAL CRITIQUE

The Federal Circuit stands alone as the only Article III court with virtually exclusive jurisdiction over a specific subject matter—patent law.[56] Despite generally favorable assessments of its performance during the first five years of its existence, criticism of the Federal Circuit began to mount in the early 1990s and has continued to this date.[57] Indeed, both academic commentators and judges have recently renewed calls to abolish the Federal Circuit's exclusive jurisdiction over patent appeals—judging this specialized

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[55] *See, e.g.,* Donald R. Songer, Jeffrey A. Segal & Charles M. Cameron, *The Hierarchy of Justice: Testing the Principal-Agent Model of Supreme Court-Circuit Court Interactions*, 38 AM. J. POL. SCI. 673 (1994) (describing the principal-agent theory of judicial decision-making as "view[ing] the appeals courts acting as agents on behalf of their principal, the Supreme Court.").

[56] Approximately one third of the Federal Circuit's docket consists of patent cases. Tony Dutra, *'Introspective Look' at Federal Circuit Highlights Breadth of Court's Docket*, 77 PAT. TRADEMARK & COPYRIGHT J. 560, 560 (2009) (specifying that thirty-one percent of the court's docket consists of intellectual property cases, the majority of which involve patents). For this reason, many commentators describe the Federal Circuit as a "semi-specialized," rather than a specialized court. *See, e.g.,* John Golden, *The Federal Circuit and the D.C. Circuit: Comparative Trials of Two Semi-Specialized Courts*, 78 GEO. WASH. L. REV. 553 (2010). For the purpose of this article, however, the important institutional features of the Federal Circuit are its near complete jurisdictional control over patent appeals, and the conceptualization of the court (both by Federal Circuit judges and by other courts) as having special expertise in patent law. S*ee infra* Part ___.

[57] *See, e.g.,* Dreyfuss, *supra* note ___.

court to be the cause of an ossified jurisprudence that is out of step with the needs of communities of innovators.[58] This Part places this article's contribution in the context of current debates surrounding the institutional design of the Federal Circuit. It argues that current institutional critiques of the Federal Circuit can be best framed as three types, concerning: (1) the relationship of the Federal Circuit with other decision-making bodies and courts; (2) the adjudicative "form" of patent law; and (3) the adjudicative "substance" of patent law. It then summarizes the explanations to these shortcomings proposed by critics. It closes by showing how current accounts of the Federal Circuit provide a limited and incomplete description of its behavior.

A. Institutional Critique

1. Relationship with lower courts

The traditional doctrine of appellate review dictates that appellate courts show deference to trial courts' findings of fact, but not to their legal conclusions. Rule 52(a) instantiates this doctrine through two different standards of review.[59] Thus, an appeals court reviews legal conclusions *de novo*, but reviews factual findings under the more deferential *clearly erroneous* standard.[60] Academic commentators have criticized the Federal Circuit for sidestepping this division of labor between trial and appellate courts, either by interpreting questions of fact, or mixed questions of law and fact, as purely questions of law, or by plainly making factual findings.[61] Commentators have blamed this anomalous behavior for creating increased unpredictability and uncertainty in patent claim construction[62] and, more

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[58] *See, e.g.,* Rai, *supra* note ___, at 1106-1107; Thomas, *supra* note ___, at 796.

[59] FED. R. CIV. P. 52(a): "Findings of fact, whether based on oral or documentary evidence, shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses."

[60] In one of its only two patent opinions of the 1980s the Supreme Court required the Federal Circuit to adhere to the same standard of review of factual questions as other Article III courts. Dennison Manufacturing Co. v. Panduit Corp., 475 U.S. 809 (1986) (per curiam).

[61] *See, e.g.,* Rai, *supra* note ___, at 1056 (The Federal Circuit "has subjected trial court fact finding in infringement or declaratory judgment actions to a level of review that is contrary to traditional principles of appellate review."); William F. Lee & Anita K. Krug, *Still Adjusting to Markman: A Prescription for the Timing of Claim Construction Hearings*, 13 HARV. J.L. & TECH. 55, 67 (1999) ("Although, according to the Federal Circuit and the Supreme Court, Markman should have ushered in greater uniformity, predictability, and certainty in patent litigation, many believe that the holding has had the opposite effect. This is largely because Federal Circuit review of claim interpretation is de novo.").

[62] *See, e.g.,* Jonas Anderson & Peter Menell, *Informal Deference*, 108 NW. U. L. REV. 1, 1 (2014) ("[T]he Federal Circuit's adherence to the de novo standard has frustrated district courts' distinctive capabilities for apprehending and resolving the factual disputes inherent in claim construction determinations."); David Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 259 (2008) (noting that the high reversal rates in claim construction decrease incentives for trial judges to learn, increases the unpredictability of appellate outcomes, and decreases the possibility of settlement); Christian A. Chu, *Empirical Analysis of the Federal Circuit's Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075, 1113 (2001).

broadly, for divorcing patent law from the context-specific needs of different innovation communities.[63]

The Federal Circuit's proclivity for interpreting arguably factual questions as issues of law is seen most clearly in claim construction—the determination of the "metes and bounds" of the inventive territory. Claim construction differs from statutory interpretation—an issue of law—in that patent claims are analyzed from the perspective of a "person having ordinary skill in the art" (PHOSITA). [64] Thus, there is a good argument that expert testimony regarding how a PHOSITA would understand a claim should play an important role in ensuring agreement between the relevant community of innovators and the ultimate interpretation of the claim language at issue. Evaluating expert evidence and its credibility is a task traditionally considered "fact finding," and therefore the province of the trial court. Nevertheless, the Federal Circuit has not interpreted any aspect of claim construction—including the use and evaluation of expert testimony—as fact-finding.[65]

This interpretive stance has generated vigorous criticism from both academics and District Court judges. One scholar observed that the Federal Circuit is simply ignoring both the "significant role for facts in claim construction"[66] as well as crucial Supreme Court language in *Markman v. Westview Instruments, Inc.*,[67] that characterizes claim construction as a "mongrel practice" involving both legal and factual issues.[68] District court judges have also been critical of the Federal Circuit's penchant for de novo review in claim construction. For example, Chief Judge Saris of the District Court of Massachusetts argued "there should be more deference [to the district judge on claim construction] particularly when the district judge takes expert testimony or receives other extrinsic evidence."[69] And while serving at the District Court, judge O'Malley (currently a judge at the Federal Circuit) observed: "it is a hard pill to swallow as a district judge that, after seeing the

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[63] *See, e.g.*, Rai, *supra* note ___, at 1106-1107; Thomas, *supra* note ___, at 796.
[64] Rai *supra* note ___ at 1047 ("In many cases involving technically complex invention, the judge would be well advised to turn to external factual evidence (known in the patent lexicon as "extrinsic evidence") on how the term is interpreted in the relevant scientific or technological community."); *Id.* at 1046 ("The mechanism that the patent statute uses to perform this mapping onto the 'real world' of innovation is a construct known as the 'person having ordinary skill in the art.'")
[65] *Cybor Corp.,* 138 F.3d 1448, 1451 (Fed. Cir. 1998) (determining that the Federal Circuit shall review district court claim construction decisions de novo).
[66] Rai *supra* note ___ at 1048.
[67] *Markman v. Westview Instruments, Inc.,* 517 U.S. 370, 378 (1996).
[68] *Id. See also* Anderson & Menell, *supra* note ___ at 6. Anderson and Menell have expressed similar concerns and urged the court to adopt a "hybrid standard" of review. Such a standard "would defer to trial judges' factual determinations" on how a PHOSITA would understand technical terms but "would retain de novo authority over whether the trial court's factual finding inappropriately overrides more specific intrinsic indications of the patent's scope."
[69] *See, e.g.,* Kathleen M. O'Malley, Patti Saris & Ronald H. Whyte, *A Panel Discussion: Claim Construction from the Perspective of the District Judge*, 54 CASE W. RES. L. REV. 671, 679-680 (2004) (statement of Hon. Patti Saris).

experts, and hearing the experts, our efforts to answer those questions are subject to a completely de novo review and a blank record."[70]

The Federal Circuit's tendency to review de novo arguably factual issues extends beyond claim construction. For example, two cases heard by the Supreme Court in its 2013 term involved the proper standard of review of district court decisions to award attorneys' fees in exceptional cases pursuant 35 U.S.C. § 285.[71] In *Highmark Inc. v. Allcare Health Management Systems, Inc.,* petitioners argued that the Federal Circuit had arrogated the "responsibility of applying a fact-dependent legal standard" thus "improperly divid[ing] labor between the trial courts and courts of appeal."[72] In *Octane Fitness, LLC v. Icon Health & Fitness, Inc.*, petitioners similarly argued that the Federal Circuit had "improperly appropriate[d] a district court's discretionary authority to award attorney fees to prevailing accused infringers in contravention of statutory intent and this Court's precedent."[73] In both cases, the Supreme Court sided with petitioners, striking down the Federal Circuit's de novo standard of review.[74] The Court emphasized that the Federal Circuit had relied on an "unduly rigid" framework that "impermissibly encumbers the statutory grant of discretion to district courts."[75]

Commentators have also criticized the Federal Circuit for acting as a fact-finder itself—even on issues that it recognizes as plainly factual matters. For example, even though the Federal Circuit considers the ultimate question of patent infringement to be a factual determination,[76] it often issues a ruling on infringement following claim construction, rather than remand the case for a new trial.[77] William Rooklidge and Matthew Weil have criticized the Federal Circuit's "judicial hyperactivity" in "reaching out to make factual findings as an alternative to remanding a case to be considered anew in the district court."[78] In this context, Arti Rai has criticized the court's penchant for "simply declar[ing] that there can be no factual dispute with respect to infringement."[79] And in decisions concerning patent validity, including nonobviousness and disclosure determinations, Rai contends that the Federal Circuit has "merely paid lip service to deference,"[80] but has actually substituted its own fact-finding for that of the district court.[81]

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[70] *Id.* (statement of Hon. Kathleen O'Malley).
[71] *Highmark Inc. v. Allcare Health Management Systems, Inc.,* No. 12-1163; *Octane Fitness, LLC v. Icon Health & Fitness, Inc.*, No. 12-1184.
[72] *Highmark* at
[73] *Octane Fitness* at
[74] *Highmark* at; *Octane Fitness* at
[75] *Octane Fitness* at 7.
[76] Hilton Davis Chem. Co. v. Warner-Jenkinson Co., 62 F.3d 1512, 1520–21 (Fed. Cir. 1995) (en banc).
[77] *See, e.g.,* Rooklidge & Weil, *supra* note ___ , at 725 (2000)
[78] Rooklidge & Weil, *supra* note ___, at 725 (2000)
[79] Rai *supra* note ___, at 1060.
[80] Rai *supra* note ___, at 1063.
[81] *Id.*

Federal Circuit judges themselves are not all of a piece: some have opposed a purely *de novo* standard of review in claim construction and other arguably factual inquiries, such as whether a case is exceptional.[82] Yet, the relatively few dissents in claim construction and the recent Federal Circuit decision in *Lighting Ballast* confirming the continued validity of a purely *de novo* standard of review, imply a continued tendency to review de novo arguably factual issues.[83] Indeed, it is telling that Federal Circuit judges themselves have characterized the court's behavior as a "*temptation* to label everything legal and usurp the province of the fact finder with our manufactured de novo review."[84]

Whether a more deferential standard of review is normatively desirable is an open question, given the Federal Circuit's mandate to maintain uniformity, as well as its unique knowledge of patent law. Indeed, Rochelle Dreyfuss has suggested that the Federal Circuit's "unique responsibility towards patent law argues for a broader scope of review over factfinding."[85] Nevertheless, it is clear that the Federal Circuit has chosen not to defer to the District Court on issues for which there is a strong case for deference under traditional principles of appellate review.

2. Relationship with other specialized bodies

The Federal Circuit also interacts routinely with two other specialized bodies that are thought to possess a degree of expertise in patent law: the Patent and Trademark Office (PTO) and the International Trade Commission (ITC). The Federal Circuit has an asymmetric relationship with the PTO: it can review directly its *denials* of patent protection, but not its patent *grants*. The latter only reach the Federal Circuit through an appeal from a District Court decision. The ITC makes patentability decisions under section 337 of the Tariff Act, which gives the ITC authority to grant broad

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[82] Judge Mayer, joined by Judge Newman, wrote a dissent in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1330 (Fed. Cir. 2005) (Mayer, J., dissenting), "reiterating his continued frustration with "the futility, indeed the absurdity, of this court's persistence in adhering to the falsehood that claim construction is a matter of law devoid of any factual component." In *Highmark*, 687 F.3d at 1357, dissenting Judge Mayer characterized the Federal Circuit as "infatuated with de novo review of factual determinations.". Also in *Highmark*, five judges (Chief Judge Rader and Judges Moore, O'Malley, Reyna and Wallach, dissenting from the Federal Circuit's denial of rehearing en banc) argued that the court's de novo standard of review in exceptional cases "invades the province of the fact finder, and establishes a review standard for exceptional case findings in patent cases that is squarely at odds with the highly deferential review adopted by every regional circuit and the Supreme Court in other areas of law." *Id.*

[83] *Lighting Ballast Ctrl. v. Philips Electronics North America Corp.*, 744 F.3d 1272, 1276-1277 (Fed. Cir. 2014) (en banc). The court cited concerns with divergent interpretations of the same patents by trial courts leading to forum shopping and uncertainty, as an important justification for de novo review of claim construction. *Id.*

[84] *Highmark* 687 F.3d at (dissent from rehearing en banc).

[85] Dreyfuss, *supra* note ___at 62

exclusion orders to companies whose patents have been infringed by imported goods.[86]

In reviewing PTO patent denials, the Federal Circuit has not followed the traditional deference structure that appellate courts employ with administrative agencies. Under Section 706 of the Administrative Procedure Act, courts review administrative fact-finding under the highly deferential "arbitrary or capricious" or "unsupported by substantial evidence" standard. Yet, until the Supreme Court intervened in *Dickinson v. Zurko*,[87] the Federal Circuit maintained that the APA did not apply to its reviews of the PTO's findings of fact, choosing to apply a more rigorous standard of review.[88] And although the Court's *Zurko* decision held that the APA did apply to the Patent Act, commentators have observed that the Federal Circuit has displayed considerable resistance to applying APA standards of review to its patent docket.[89]

The Federal Circuit has repeatedly refused to grant deference to the PTO's substantive interpretations of the Patent Act.[90] Rather, it considers the PTO to have only procedural—but not substantive—rule-making authority with respect to the Patent Act.[91] The Federal Circuit has also retained the power of adjudicating de novo whether a particular rule is procedural or substantive. As a consequence, the Federal Circuit reviews the PTO's findings of (substantive) law de novo, and its findings of fact under a "clearly erroneous" standard. Many academic commentators have criticized this division of labor, arguing for greater deference to the PTO—for example, by deferring to the PTO's determinations of whether a rule is substantive or procedural[92], or by granting the PTO substantive rule making authority and thus Chevron deference to its decisions.[93]

As elaborated further in Part II, the relationship between the Federal Circuit and the PTO can be described and understood as one of jurisdictional competition between two expert communities for control over patent law. In fact, this type of competition is expected under a sociological model of institutionalized communities of experts.

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[86] 19 U.S.C. § 337 (2006).
[87] 119 S. Ct. 1816 (1999).
[88] *Id.* at
[89] *See, e.g.,* Rai, [Engaging] *supra* note ___, at 1055.
[90] *See, e.g., Tafas v. Doll,* 559 F.3d 1345 (Fed. Cir. 2009) (holding that the PTO does not have substantive rulemaking authority); *Brand v. Miller*, 487 F.3d 862, 869 n.3 (Fed. Cir. 2007) (The PTO "does not earn Chevron deference on questions of substantive patent law.').
[91] Merck & Co. v. Kessler, 80 F.3d 1543, 1549-50 (Fed. Cir. 1996) (noting that the PTO lacks the ability to promulgate rules on the core patentability standards that carry the force of law).
[92] *See,e.g.,* Joseph Scott Miller, *Substance, Procedure and the Divided Patent Power*, 63 ADMIN. L. REV. 31 (2011).
[93] *See, e.g.,* Michael J. Burstein, *Rules for Patents*, 52 WM. & MARY L. REV 1747, 1751 (2011)*;* Jonathan S. Masur, *Regulating Patents,* 2010 SUP. CT. REV. 275, 279; Melissa Wasserman, *Chevron Deference for the PTO?* 54 WM & MARY L. REV. 1959 (2013).

The Federal Circuit has similarly refused to grant either *Chevron* or *Skidmore* deference to patent decisions from the ITC.[94] Doctrinally, the case for deference to the ITC differs from the case for deference to the PTO. Since the ITC has interpretative authority over the Tariff Act only, deference would only be warranted under APA and *Chevron* if the ITC is interpreting the Tariff Act—but not the Patent Act—when making patentability determinations.[95] Normatively, commentators are divided on whether deference to ITC is desirable. For example, focusing on the importance of avoiding a fragmented patent regime, John Thomas argues against ITC deference in patentability and infringement determinations.[96] In contrast, Sapna Kumar has argued that considerations of institutional competence and political accountability favor granting Chevron deference to ITC patentability and infringement decisions.[97]

Leaving aside whether increased deference is normatively desirable, what remains clear is that the Federal Circuit is an outlier among all Article III courts in its review of agency action.[98] Significantly, the Federal Circuit has only attempted to arrogate power over fact-finding and statutory interpretation on patent law issues, while routinely granting APA and Chevron deference to agencies that do not handle patent disputes, and to PTO and ITC on non-patent matters.[99]

3. Adjudicative "Form" of Patent Law

In a seminal article, Duncan Kennedy distinguished two "different rhetorical modes" of private law adjudication regarding the *form* of legal

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[94] *See, e.g.,* Kumar, *supra* note ___, at 1547.

[95] *See,* id. at 1562-63 (arguing that the ITC is interpreting the Tariff Act when making patentability determinations to decide whether to grant an exclusion order); *but see Process Patents*: Hearing Before the S. Comm. on the Judiciary, 110th Cong. 86-87 (2007) (statement of John R. Thomas, Professor of Law, Georgetown University) (testifying that ITC interprets Patent Act whenever it makes patent-related determinations); Joel W. Rogers & Joseph P. Whitlock, *Is Section 337 Consistent With the GATT and the TRIPS Agreement?*, 17 AM. U. INT'L L. REV. 459, 471 (2002) (arguing that in section 337 cases, ITC applies "the same substantive patent law as a federal district court would").

[96] Process Patents: Hearing Before the S. Comm. on the Judiciary, 110thCong. 84 (2007) (statement of John R. Thomas, Professor of Law, Georgetown University) ("[T]he question at issue reduces to an elemental proposition of a just system of laws: That like cases should be decided alike, regardless of the forum in which the case is heard.").

[97] *See* Kumar, *supra* note ___, at 1587,1592.

[98] Nard, *supra* note ___, at 1430 ("The impact of *Chevron* has been lost on the Federal Circuit as it relates to the BPAI's patentability determinations; whereas just the opposite can be said about the Federal Circuit's nonpatent administrative caseload."); Ronald Zibelli & Steven D. Glazer, *An Interview with Circuit Judge S. Jay Plager*, 5 J. PROPRIETARY RTS. 2, 5 (1993) (Circuit Judge, Court of Appeals for the Federal Circuit) ("There is no other administrative agency in the United States that I know of in which the standard of review over the agency's decisions gives the appellate court as much power over the agency as we have over the PTO.").

[99] *See, e.g.,* Kumar, *supra* note ___, at 1566 (noting that the Federal Circuit grants both APA and Chevron deference "when patents are not at issue"); Nard, *supra* note ___, at 1417.

decisions.[100] The first rhetorical mode "favors the use of clearly defined, highly administrable, general rules," while "the other supports the use of equitable standards producing ad hoc decisions with relatively little precedential value."[101] By all accounts, the Federal Circuit has consistently favored the use of clear and inflexible general rules.[102] Time and again, the court has attempted to distill patentability inquiries into highly administrable rules that eschew contextual analysis—and that limit the ability of lower courts to adjust their decisions to the circumstances of the case.

One of the most prominent, and most criticized, examples of Federal Circuit rule formalism is the court's development of the "teaching, suggestion, and motivation" (TSM) test for determining whether an invention is non-obvious under section 103 of the Patent Act.[103] When an invention involves combining two or more references, the TSM test required that at least one of those references contain information that would suggest, teach, or motivate a person having ordinary skill in the art (PHOSITA) to combine the references at issue.[104] Although designed to avoid hindsight bias, the TSM test ultimately prevented consideration of contextual factors, such as tacit knowledge in the relevant scientific community, that would lead one of ordinary skill in the art to combine references, even absent an explicit indication to do so.[105] This is essentially the conclusion reached by the Supreme Court in *KSR International v. Teleflex, Inc.* when it rejected the TSM test as the sole test for obviousness, and replaced it with a case-by-case focus on what scientists would know or could develop during routine research.[106] Interestingly, although one might expect the Federal Circuit in the wake of *KSR* to begin placing much more attention on defining the attributes of a

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[100] Duncan Kennedy, *Form and Substance in Private Law Adjudication*, 89 HARV. L. REV. 1685, 1685 (1976).

[101] *Id.*

[102] *See, e.g.,* Timothy R. Holbrook, *Substantive Versus Process-Based Formalism in Claim Construction*, 9 LEWIS & CLARK L. REV. 123 (2005); Nard & Duffy, *supra* note ___, at 1644; Rai, *supra* note ___, at 1040; Thomas, *supra* note ___, at 774; *see also* Peter Lee, *Patent Law and the Two Cultures*, 120 YALE L. J. 4, 21-22 (2010) (arguing that the Federal Circuit resorts to inflexible rules to avoid engaging with complex technologies).

[103] 35 U.S.C. §103(a) (2006). *See, e.g.*, Laura G. Pedraza-Fariña, *Patent Law and the Sociology of Innovation*, 2013 WISC. L. REV. 815, 823-26 (2013) (describing the evolution of the Federal Circuit's formalist obviousness jurisprudence and contrasting it with the contextual approach embraced by the Supreme Court); R. Polk Wagner & Katherine J. Strandburg, Debate, *The Obviousness Requirement in the Patent Law*, 155 U. PA. L. REV. PENNUMBRA 96, 101 (2006), http://www.pennumbra.com/debates/debate.php.

[104] Pedraza-Fariña, *supra* note ___, at 825.

[105] *Id.* at 823-25; Rebecca S. Eisenberg, *Obvious to Whom? Evaluating Inventions from the Perspective of PHOSITA*, 19 BERKELEY TECH. L. J. 885, 896 (2004) (arguing that the TSM test had the "practical effect of excluding from the analysis the tacit knowledge ordinary practitioners commonly possess).

[106] 550 U.S. 398, 421 (2007) ("A person of ordinary skill is also a person of ordinary creativity, not an automaton."); *see also* Daralyn J. Durie& Mark A. Lemley, *A Realistic Approach to the Obviousness of Inventions*, 50 WM. & MARY L. REV. 989, 999 (2008) ("[T]he one consistent strand that runs through the opinion is a rejection of rigid rules, replaced with a case-by-case focus on what actual scientists in the field would know or could develop with ordinary inventive skill.").

person having ordinary skill in the art,[107] the court still rarely does so.[108] Rather, the court appears to be sliding back into rule formalism.[109]

While the court's obviousness jurisprudence is one of the most salient examples of its reliance on rigid rules, it is by no means the only one. The Federal Circuit has favored bright-line rules over flexible standards in determining whether an invention is novel,[110] in patentable subject matter determinations,[111] remedies[112] and, more recently, in its extraordinary case jurisprudence.[113] Indeed, the Supreme Court has rejected the Federal Circuit's test for determining whether a case is "exceptional" as overly "rigid and mechanical."[114]

Commentators are split regarding the normative desirability of rule-formalism. Practicing patent attorneys have by and large welcomed the Federal Circuit's turn to rules as increasing predictability,[115] while most academic commentators have denounced it as inconsistent with patent law's goal of promoting innovation.[116] As Part II elaborates, predictions from the model of expert decision-making described in this article undercut the assumption that rule formalism will generate uniform decisions.[117] Specifically, communities of experts are expected to look for ways to free themselves from the very rules they create to constrain their subordinates when these

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[107] *See* Durie & Lemley, *supra* note ___, at 1000–03 (arguing that, in the aftermath of KSR, courts should pay increased attention to "the way in which PHOSITAs work in the real world").
[108] *See, e.g.,* Emer Simic, *The TSM Test is Dead! Long Live the TSM Test! The Aftermath of KSR, What Was All the Fuss about?* 37 AIPLA Q. J. 227, 247(2009).
[109] *See, e.g.,* Pedraza-Fariña, *supra* note ___ at 862-63 (arguing that "in its more recent opinions, the Federal Circuit has taken a narrower and more formalistic view of analogous art," which is a key step in the obviousness inquiry).
[110] *See* Thomas *supra* note ___, at 778-81.
[111] In a key patentable subject matter decision, *In re Bilski*, the Federal Circuit developed the "machine or transformation test" as the "sole test" of patentability for process claims. *In re Bilski* (Fed. Cir. 2009). On appeal, the Supreme Court refused to limit the patentability inquiry to the machine or transformation test, calling it a "categorical rule" that would "frustrate the purpose of patent law" to adapt to technological advances. *Bilski v. Kappos* U.S. ___(2010).
[112] Prior to the Supreme Court's decision in *eBay*, the Federal Circuit relied on a "general rule" that injunctions should issue in patent infringement cases absent exceptional circumstances. *eBay* reversed this general rule and held that patent infringement cases were not an exception to "the traditional four factor test applied by courts of equity when considering whether to award permanent injunctive relief to a prevailing plaintiff." *eBay v. MercExchange, LLC*, 547 U.S. 388 (2006).
[113] *See, e.g.,* Octane Fitness, LLC v. Icon Health & Fitness, Inc., 496 Fed. App'x. 57 (2012).
[114] *Octane Fitness*
[115] *See, e.g.,* Russell B. Hill & Frank P. Cote, *Ending the Federal Circuit Crapshoot: Emphasizing Plain Meaning in Patent Claim Interpretation*, 42 IDEA 1 (2002); Lee & Evans, *supra* note ___, at 7; Thomas *supra* note ___, at 794 (noting that patent lawyers were a powerful lobby that advocated for clear rules in patent law); Victoria Slind-Flor, *Federal Circuit Judged Flawed*, NAT'L L.J., Aug. 3, 1998.
[116] *See, e.g.,* Rai *supra* note ___ at 1106-1107; Thomas *supra* note ___, at 796.
[117] *See supra* Part III.C.2.

rules do not accord with their intuitions, thus making a rule-based system much less predictable than would otherwise be anticipated.[118] That the Federal Circuit does indeed routinely "break" its own rules helps explain, at least in part, the puzzling observation that the Federal Circuit has in fact failed to bring uniformity and predictability to its docket.[119]

4. Adjudicative "Substance" of Patent Law

The creation of the Federal Circuit has also had an impact on the "substance" of patent law, that is, the content of rules or standards that regulate what may be patented, as well as the scope and content of patent rights. Commentators have criticized the Federal Circuit for having a pro-patentee bias, which has led to an unwarranted expansion in the number of patents held valid.[120] Two mechanisms are thought to drive this "patent explosion."[121] First, the court has expanded potentially patentable subject matter, placing more human activities than ever before under the regulatory structure of patent law.[122] Second, the court has lowered the bar to patentability, largely by weakening the obviousness requirement.[123]

Nevertheless, the court's jurisprudence is not so clearly patentee-friendly. As John Thomas has remarked, loosening the obviousness standards can cut both ways: by making it easier to patent small improvements over existing technology, lowering the bar to patentability may benefit improvers at the expense of pioneer inventors.[124] Further, the court's utility and written description jurisprudence has made it harder to obtain patents in some

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118 *Id.*

119 *See, e.g,* Gugliuzza [Patent Law Federalism] *supra* note ___, at 37 (noting that the Federal Circuit has failed to bring predictability to patent appeals).

120 *See, e.g.,* Adam Jaffe & Josh Lerner, *supra* note ___, at 125-26 (arguing that "the primary direction of the [Federal Circuit's] changes has been in the direction of strengthening patent holders' rights" and criticizing such "strengthening of patent rights" as going "beyond recalibration to reach troubling proportions.").

121 *See, e.g.,* Bronwyn Hall, *Exploring the Patent Explosion*, 30 J. TECH. TRANSFER 35, 38 (2005) ("[T]he creation of a centralized court of appeals specializing in patent cases in 1982, together with a few well-publicized infringement cases in themid-1980s, have led to an increased focus on patenting by firms in industries where patents have not traditionally been important, such as computers and electronics").

122 *See, e.g.*; Hall, *supra* note ___ at 4 (characterizing the Federal Circuit's jurisprudence as "expand[ing] legitimate subject matter"); John Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139, 1139 (1999) (describing how the PTO and the Federal Circuit have slowly expanded "the sorts of subject matter that may be appropriated via the patent system").

123 *See, e.g.,* Glynn Lunney & Christian Johnson, *Not So Obvious After All: Patent's Nonobviousness Requirement, KSR, and the Fear of Hindsight Bias,* 47 GA. L. REV. 41, 42 (2012) ("With the rise of the Federal Circuit, the height of the nonobviousness hurdle has steadily declined."); Pedraza-Fariña, *supra* note ___, at 818 (describing how the Federal Circuit's obviousness jurisprudence prior to the Supreme Court's decision in *KSR v. Teleflex* lowered the bar to patentability); Rai, *supra* note ___, at 1111 ("The role of the nonobviousness requirement in invalidating patents has declined particularly steeply.").

124 Thomas, *supra* note ___, at 773.

technology areas.[125] And the court's infringement jurisprudence has had decidedly mixed effects. While the court's preference for permanent injunctions for patent infringement clearly benefited patentees,[126] the court has also weakened the doctrine of equivalents, a position that benefits non-patent holders.[127]

Rather than focus on the court's potential bias in favor of a specific type of player (patentee vs. non-patent holder), a more apt description of the court's jurisprudence is that it has sought to expand the reach of its expertise by finding new areas for its application.[128] Seen in this light, the court's expansion of the categories of inventions that may be patented, or its revival of design patents,[129] can be understood as an expected behavior of expert communities.

B. Existing Explanations of Federal Circuit Behavior

Commentators have advanced several explanations for some of the puzzling features of the Federal Circuit described in the previous sections: (1) centralization theory; (2) information-costs theory; (3) capture and tunnel vision. Nevertheless, none of them can fully account for Federal Circuit behavior. This next section engages with these explanations and contends that the expert-community model outlined here both complements these explanatory frameworks and is necessary to fully understand the Federal Circuit.

1. Centralization Theory

Several scholars have attributed the Federal Circuit's shortcomings to its central position as the single court for patent appeals.[130] For example, Craig Nard and John Duffy argue that the Federal Circuit has achieved uniformity

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[125] *See,* Ariad Pharm. Inc. v. Eli Lilly & Co., 598 F.3d 1336 (Fed. Cir. 2010); In re Fisher, 421 F.3d 1365, 1371 (Fed. Cir. 2005); Timothy Holbrook, *Patents, Presumptions, and Public Notice*, 86 IND. L. J. 779, 803 (2011) (describing the Federal Circuit's disclosure jurisprudence as "creat[ing] an unwarranted bias against patents"); Sean B. Symore, *Making Patents Useful*, 98 MINN. L. REV. 1046, 1049 (2014) (arguing that the utility requirement's "invigorated role in patent law" has led to "a bias against patentability for certain types of inventions" and in particular those in the chemical industry).

[126] *See, e.g.* W.L. Gore & Assoc. v. Garlock, Inc., 842 F.2d 1275 (Fed. Cir. 1988).

[127] *See, e.g.,* John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955 (2007).

[128] *See* Abbott, *supra* note ___ at 9 (arguing that expert communities seek to expand their jurisdiction by "seiz(ing) new problems" to which they can apply their "knowledge system.").

[129] *See* High Point Design LLC v. Buyer's Direct, Inc., 730 F.3d 1301 (Fed. Cir. 2013); *see also* James Grimmelman, *If our top patent court screws up slipper patents, how can it rule sensibly on smartphones?* WASH. POST (September 24, 2013), http://www.washingtonpost.com/blogs/the-switch/wp/2013/09/24/if-our-top-patent-court-screws-up-slipper-patents-how-can-it-rule-sensibly-on-smartphones/ ("The nation's top patent court has been on a Frankenstein-like quest to reanimate design patent law").

[130] *See, e.g.,* Nard & Duffy, *supra* note ___, at 1622 ("The fault is much more likely to be structural, and it can be traced directly to the Federal Circuit's exclusive subject matter jurisdiction over patent cases.").

at the expense of quality.[131] According to Nard and Duffy, the Federal Circuit's mandate (and quest) to achieve uniformity in patent law has resulted in decisions that are divorced from the needs of the very communities whose innovation patent law is supposed to incentivize.[132] Nard and Duffy argue that a centralized appeals structure facilitates not only uniformity but also isolation and lack of experimentation with novel approaches to patent law.[133] Their proposed solution is to reconfigure the centralized structure of patent appeals to re-introduce a measure of competition and diversity that would inject more incremental innovation and flexibility into the patent system.[134] Similarly, in a recent keynote address, Chief Judge Diane Wood argued for the reintroduction of "the same kind of marketplace of ideas [in patent law] at the court of appeals level that we have for almost every other kind of claim"[135] by allowing parties to file their case either in the Federal Circuit or in the regional circuit where their claim was first filed.[136]

Nevertheless, taken alone, centralization and the drive for uniformity cannot explain many of the features of the Federal Circuit described above. First, the Federal Circuit often disregards its own "rules," a fact that has led many district court judges to express their frustration with the appellate court.[137] Strict adherence to the uniformity principle would not predict such a malleable interpretation of its own precedent. In addition, the Federal Circuit has an unusually high rate of dissent for an appellate tribunal[138]—a fact that is not easily reconciled with a court for which uniformity is of paramount

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131 *Id.* at 1620 (arguing that Federal Circuit precedent does not " adequately reflect[] current knowledge regarding the beneficial functions of the patent system in generating technological innovation, the potential problems of patent rights in foreclosing legitimate competition, and the need for predictable rules capable of curtailing litigation costs.")

132 *Id.*

133 *Id.* at 1649 ("Without the benefits of competition and diversity, the Federal Circuit is isolated from noteworthy doctrinal proposals and normative prescriptions that would be generated by other circuit courts, and is less likely to be presented with or to entertain ideas articulated by economists, legal scholars, and other judges.").

134 *Id.* at 1623, 1625 (proposing "a shift from a strategy based on uniformity to one that emphasizes diversity, competition, and incremental innovation" by "both the Federal Circuit and United States Court of Appeals for the District of Columbia Circuit (D.C. Circuit) should have jurisdiction over appeals from the PTO").

135 Hon. Wood, *supra* note ___, at 9.

136 *Id.*

137 Inconsistent rule application is most salient in issues of claim construction and choice of law rules. *See, e.g., A Panel Discussion: Claim Construction from the Perspective of the District Judge,* 54 CASE W. RES. L. REV. 667, 678 ("[P]art of the problem [with Federal Circuit jurisprudence] is that, just when you feel like you know the rules, along comes that case that does not seem to follow those rules."); Ted Field, *Improving the Federal Circuit's Approach to Choice of Law for Procedural Matters in Patent Cases,* 16 GEO. MASON L. REV. 643, 654-53 (2009) ("[T]he [Federal Circuit] has applied its choice of law rules consistently within particular procedural issues, as well as inconsistently between different procedural issues that the court should seemingly treat the same. In many cases, the court simply ignores the choice-of-law issue altogether.").

138 *See, e.g.,* Rantanen, Jason and Petherbridge, Lee, Disuniformity (January 24, 2014). U Iowa Legal Studies Research Paper No. 13-42; Loyola-LA Legal Studies Paper No. 2013-39. Available at http://ssrn.com/abstract=2351993 or http://dx.doi.org/10.2139/ssrn.2351993

importance.[139] As highlighted above, these features are best explained as a consequence of institutionalized expert decision-making.[140] Second, it is unclear how centralization and the uniformity principle explain the Federal Circuit's relationship with other expert bodies, such as the PTO and the ITC.[141] The low level of deference accorded to those institutions has arguably done much to undermine the predictability and uniformity of patent law.[142] But there is nothing inherent in the concept of centralization that predicts this low-level of deference to institutions that have a considerable level of expertise in patent law issues.

2. Information-Costs Theory

Peter Lee has advanced an "information-cost theory" of the Federal Circuit that explains adjudicative rule formalism as a heuristic to manage the cognitive burdens and technological anxieties of generalist district court judges.[143] Under this account, the Federal Circuit prefers rigid rules to flexible standards because rules diminish the need for lay judges to engage deeply with complex technologies.[144] Similarly, John Thomas argues that simple rules "might be seen as providing a well-meaning judiciary with a thread through the labyrinth [of complex patent law]."[145] As elaborated in Part II, an expert decision-making model places the actions of the Federal Circuit within a broader framework. Consistent with Lee's information-cost theory, expert communities resort to rules to codify (and simplify) expert knowledge for external, lay consumption. But rules also act as gatekeepers of an expert community's jurisdictional power, by implicitly stating that outsiders do not possess the requisite know-how to correctly engage with a particular subject matter (in this case, technology policy through patent law).[146] Rules can also enhance the legitimacy of weak expert communities. Because rules arguably reduce the influence of subjective factors in decision-making, they serve to manage internal dissent and to increase external support.[147]

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[139] Nard and Duffy recognize that dissents can be a source of divergent opinions, but argue that they are insufficient to overcome the pull of circuit precedent, and thus not as efficient in creating legal innovation as a decentralized system of appellate courts. *Supra* note ___, at 1646.

[140] *See infra* Part II.C. This article does not argue that centralization and the drive for uniformity don't play a role in explaining Federal Circuit behavior. Rather, it argues that a conceptualization of the Federal Circuit as an institutionalized community of experts helps explain a host of additional puzzling behaviors and provides an additional lens by which to understand, judge, and design the institutions in charge of administering patent law.

[141] *See infra* Part II.C.1.

[142] *See infra* Part II.C.2.

[143] Lee, *supra* note ___, at 25.

[144] *Id.* at 9.

[145] Thomas, *supra* note ___, at 795.

[146] *See infra* Part ___.

[147] *See infra* Part ____.

3. Capture and Tunnel Vision

A final explanatory framework used to describe the Federal Circuit's behavior relies on its status as a "specialized" court. Indeed, the dangers of a specialized judiciary appeared prominently in debates leading to the creation of the Federal Circuit.[148] Both Congress and most academic commentators, however, focus almost exclusively on two features of a specialized judiciary that are thought to negatively influence decisional content—capture and tunnel vision.[149] Capture describes the *external* influence of interest groups on the policies and decisions of a particular institution. It is not, however, uniquely linked to specialization. Both centralization and specialization can facilitate capture by special interest groups. The former does so by making it easier to coordinate and focus lobbying activities on a small number of judges; and the latter because specialized judges are likely to be part of the same professional network with repeat industry players.[150]

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[148] *See, e.g., Hearing on S. 21 and S.537 Before the Subcomm. on Courts of the S. Comm. on the Judiciary*, 97th Cong. 211 (1981) ("The quality of decision-making would suffer as specialized judges become subject to 'tunnel vision' seeing the cases in a narrow perspective without the insights stemming from broad exposure to legal problems in a variety of fields.").

[149] *See*, S. Rep. No. 97-275, at 6 (1981) ("[T]he subject matter of the new court will be sufficiently mixed to prevent any special interest from dominating it."); H.R. Rep. No. 97-312, at 31 (1981) ("Several witnesses before the Committee expressed fears that the Court of Appeals for the Federal Circuit would be *unduly specialized* or would soon be captured by specialized interests. This provision should reduce these fears by ensuring that all the judges sit on a representative sampling of all the cases heard. It will, in short, prohibit judges with a patent law expertise from sitting on a disproportionate number of patent cases.") (emphasis added); Dreyfuss, *supra* note ___, at 3 (noting that critics of specialization argue it "will produce a court with tunnel vision, with judges who are overly sympathetic to the policies furthered by the law that they administer or who are susceptible to 'capture' by the bar that regularly practices before them."); William Landes & Richard Posner, *An Empirical Analysis of the Patent Court*, 71 U. CHI. L. REV. 111, 111-112 (2003) (positing that a specialist court may because "interest groups that had a stake in patent policy would be bound to play a larger role in the appointment of judges of such court than they would in the case of the generalist federal courts."); Rai, *supra* note ___, at 1110-1115 (describing tunnel vision as a "well-known liability for specialist courts," and exploring (but subsequently discarding) whether the Federal Circuit's formalist jurisprudence may be explained by capture alone); Richard L. Revesz, *Specialized Courts and the Administrative Lawmaking System*, 138 U. PA. L. REV. 1111, 1146 (1990) ("[S]pecialized courts tend to [control administrative action] less effectively than generalist courts because they are more likely to exhibit systemic biases, often in the agency's favor."); Simon Rifkind, *A Special Court for Patent Litigation? The Danger of a Specialized Judiciary*, 35 A.B.A. J. 425, 425 (1951) ("Once you segregate the patent law from the natural environment in which it now has its being, you contract the area of its exposure to the self-correcting forces of the law."); Letter from law school deans and legal scholars, to Arlen Specter, Chairman, Comm. of the Judiciary (Mar. 14, 2006) (*available at* http://www.law.yale.edu/documents/pdf/LettertoSenSpecter(1).pdf) ("[S]pecialist judges are exposed solely or mostly to a single narrow field of law. This can generate not only tunnel vision but also an ossification of the views in such judges. Moreover, specialized courts are considered more prone than generalist courts to being "captured.").

[150] Both specialization and centralization also increase the chances that a small number of judges will be exposed to repeat players with specific policy positions that—if aligned—are likely to nudge the court's decisions in one specific direction.

Congress was also concerned with what it termed the "undue specialization" of the Federal Circuit.[151] Concerns about undue specialization relate to *internal* characteristics of specialized bodies that are thought to negatively impact decision-making. Thus, Congress often referred to the "narrowness," "technical focus" and "tunnel vision" that may arise from specialization.[152] Counteracting such narrowness required exposing judges to cases from a variety of fields,[153] and ensuring the court was not simply staffed by "patent lawyers."[154] But tunnel vision is an ambiguous concept. It hides multiple potential mechanisms for influencing the content of judicial decisions. Consider, for example, the following five:

1. The professional biases of patent lawyers towards regarding patents as valid will cause judges with a background in patent practice to favor patent holders.[155] (what this article analyzes as a form of *professional typecasting*)
2. The technical background of judges will influence how they evaluate the worth (and thus patentability) of particular inventions. (what this article analyzes as *technical typecasting*)
3. Judges who are experts in patent law are unable to fully grasp and consider the impact of their decisions on other fields of law, notably competition law. (what this article analyzes as *inability to self-coordinate*)

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[151] *See, e.g.,* H.R. Rep. No. 97-312, at 31 ("Several witnesses before the Committee expressed fears that the Court of Appeals for the Federal Circuit would be *unduly specialized*. . .") (emphasis added); *id.* at 50 ("This amendment does not prohibit the President from appointing a patent lawyer to the Court of Appeals for the Federal Circuit, or a government contracts lawyer to the Claims Court. It does, however, clearly send a message to the President that he should avoid *undue specialilzation*[sic] on both courts.")(emphasis added); S. Rep. No. 97-275, at 6 ("While the suggestion has been made that this objective might be accomplished simply by expanding the jurisdiction of the CCPA, the committee rejected such an approach as being inconsistent with the imperative of avoiding undue specialization within the Federal Judicial system.").

[152] *See, e.g.,* Report of Committee of the section of patent, trademark, and copyright law to the section of patent law of the ABA, at 548 ("The proposed method of making up the Court will obviate the principal objection which exists to the creation of a court of patent appeals . . . which is, that a permanent court consisting of judges appointed for life and occupied in the sole work of deciding patent cases would be liable to grow narrow and technical in its views and procedure.")

[153] *See, e.g.,* H.R. Rep. No. 97-312, at 19 ("By combining the jurisdiction of the two existing courts along with certain limited grants of new jurisdiction, the bill creates anew intermediate appellate court markedly less specialized than either of its predecessors and provides the judges of the new court with a breadth of jurisdiction that rivals in its variety that of the regional courts of appeals.")

[154] *See, e.g.,* Report of Committee of the section of patent, trademark, and copyright law to the section of patent law of the ABA, at 548-49 ("Under the proposed plan the judges would come to the court of patent appeals trained for their work by experience on the bench in the field of general jurisprudence. It would give us a court of judges, and not of mere patent lawyers.").

[155] *See, e.g.,* Baum, *supra* note ___, at 36 (arguing that people who work in patent law are likely to have "a narrower range o opinion about the issues in their field than does the general public or political and social elites as a whole.").

4. Judges get so used to a particular way of approaching problems within their expertise they no longer question (or are willing to question) the validity of their foundational assumptions. (what this article analyzes as a consequence of *epistemic monopoly and epistemic autonomy*)
5. Expert judges will no longer be understood by non-experts—and thus their work will not be transparent and easily accessible to lay people. (Raising issues of public *trust* and the *legitimacy* of expert-decision making.)[156]

Whether and how "tunnel vision" should be corrected depends on understanding the specific mechanisms through which it influences decision-making.

Capture and tunnel vision are also insufficient to explain the specific features of Federal Circuit jurisprudence described above. First, capture is overinclusive, as it describes behavior linked both to centralization and specialization. Most importantly, although the Federal Circuit has long been viewed as a pro-patent court, many of its decisions have limited the scope of patent grants, thus undercutting the explanatory power of capture theory.[157] Further, neither capture nor tunnel vision can fully explain the interactions between the Federal Circuit and other judicial and administrative bodies, or its preference for rules over standards.

The work of political scientist Lawrence Baum is an exception to this narrow treatment of specialized courts. Baum describes tunnel vision and capture as the two channels by which specialization can influence the substance of judicial decisions.[158] He then, however, goes on to disaggregate tunnel vision into four components: assertiveness, insularity, professional bias, and stereotyping.[159] Baum's analysis is individualistic: it focuses on how individual judges' behavior is influenced by his or her possession of specialized knowledge.[160] The analysis advanced here focuses not on individual actors but on the aggregate behavior of expert institutions and groups of experts, as well as on how expertise develops as a process of socialization into the expert practices of a group, a process that—crucially—

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[156] It is to this aspect of "tunnel vision" that Judge Wood appears to be referring to when remarking: "Law, in the final analysis, governs society. It should not be an arcane preserve for specialists, who never emerge to explain, even to their clients, what the rules are or why one side or the other prevailed." Wood, *supra* note ___ at 7.
[157] *See, e.g.,* Dreyfuss, *supra* note ___ at 28 (noting that in the five years following its creation the Federal Circuit adopted rules "which favor technology users," such as stringent reviews of practice before the PTO and a restrictive interpretation of the doctrine of equivalents).
[158] *See, e.g.,* Baum, *supra* note ___, at 34 ("The potential effects of specialization on the substance of judicial policy . . . operate through two mechanisms: immersion of judges in a relatively narrow subject matter and enhancing the influence of . . . interested groups.").
[159] *Id.* at 35-36.
[160] *Id.*

requires the acquisition of tacit knowledge. Because of this difference in the locus of analysis, it offers a different, yet complementary, description of expert communities. Importantly, key insights emerge when we focus on studying the activities, work, and discourse of communities of experts, rather than studying individuals themselves. For example, Baum's approach does not attempt to explain rule-formalism or how expert communities (such as the PTO, ITC and the Federal Circuit) relate to each other. In contrast, this article's focus on the jurisdictional competition for epistemic control among expert groups, and on the tacit knowledge/codification dichotomy provides a framework of analysis that explains an expert community's resort to rules, and its relationship with other communities with the same subject-matter expertise.

II. A TYPOLOGY OF EXPERT DECISION-MAKING

This Part first synthesizes and brings together two approaches to the study of expertise. It then develops a typology of features of expert communities, elaborating upon these insights in the sociology of expertise. To both develop the typology and to test its main claims and consequences, Section ___ uses the Federal Circuit as a case study.

A. Expertise As Competition for Maximal Autonomy and Control

An important approach to the study of expertise focuses on how expertise is organized and controlled in society. This line of research studies the development of professional organizations and other institutionalized forms of expertise, as well as how expert institutions interact with each other.[161] From this body of work, emerge three key themes with important consequences for the study of expert courts: (1) expert communities' interdependence and competition for jurisdictional control (2) abstraction and codification as mechanisms of competition and legitimation (3) subjective and objective properties of tasks and problems as both enabling and restraining jurisdictional expansion. I explore these three themes below.

1. Interdependence and Competition for Jurisdictional Control

Through a series of studies of professional organizations (such as those of doctors and psychologists) Andrew Abbott and Eliot Friedson theorize that the essence of a profession is to seek maximal autonomy and control over the set of abstract principles within its "jurisdiction."[162] In turn, a profession's jurisdiction is simply those tasks the profession considers to be (and that it convinces society should be) within its body of expert

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[161] *See, e.g.,* Elizabeth H. Gorman & Rebecca L. Sandefur, *"Golden Age," Quiescence, and Revival: How the Sociology of Professions Became the Study of Knowledge-Based Work*, 38 WORK & OCCUPATIONS 275 (2011); ELIOT FRIEDSON, PROFESSIONALISM THE THIRD LOGIC (2001); ANDREW ABBOTT, THE SYSTEM OF PROFESSIONS (1988); MAGALI LARSON, THE RISE. OF PROFESSIONALISM: A SOCIOLOGICAL ANALYSIS (1977).

[162] Abbott, *supra* note ___, at 71; ELIOT FREIDSON, PROFESSIONAL POWERS: A STUDY OF THE INSTITUTIONALIZATION OF FORMAL KNOWLEDGE (1986).

knowledge.[163] Having complete jurisdictional control means having the power to define and classify a problem, to define and apply the correct treatment, and to evaluate the treatment's success.[164] These studies define the term "profession" quite broadly, to encompass any exclusive or semi-exclusive community of experts that develops abstract knowledge and applies it to particular cases.[165]

In essence, the claim is straightforward: because organized groups of experts will seek to maintain control over their body of knowledge (composed of formal, abstract principles), they will reject claims by those outside the profession to legitimately dictate what those professionals do or how they do it. Yet, this claim has crucial implications for understanding the interaction among expert communities and between experts and non-experts. This initial claim immediately implies another: professions do not exist in isolation, but are embedded in an ecosystem where they compete with each other for jurisdictional control.[166] In turn, dissecting the mechanisms by which such competition takes place is important for understanding expert community dynamics. The following two subsections explore three such mechanisms: (a) the creation of a system of abstract knowledge; (b) codification of (at least a portion of) such knowledge; (c) competing framings of tasks and problems.

2. Abstraction and Codification as Mechanisms of Competition and Legitimation

Professions seek to gain and maintain jurisdictional control through the development and control of a *system of expert abstract knowledge*, which only members of the profession have access to and can apply to specific cases.[167] For example, different medical specialties have developed abstract knowledge systems that correlate symptoms with disease diagnoses, mechanistic explanations for the disease, and appropriate treatments. Law is itself built on different systems of abstract knowledge. In patent law, concepts such as "a person of ordinary skill in the art," "conception," and "nonobviousness," to name only a few, are elements in an abstract knowledge system designed to ultimately incentivize innovation.

A classic example of jurisdictional competition through the control of a system of abstract knowledge concerns the struggle among the clergy, medicine, psychiatry, and criminal law to define and treat alcoholism. Each one of these four communities sought to conceptualize alcoholism—and

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[163] Abbott, *supra* note ___, at __.
[164] *Id.*
[165] *See, e.g.,* Gorman & Sandefur, *supra* note ___, at 277 ("In the eyes of contemporary scholars, the commonalities between traditional professions and new forms of knowledge-based work are more important than the differences.").
[166] Abbott, *supra* note ___, at 19 ("It is control of work that brings the professions into conflict with each other and makes their histories interdependent.").
[167] *Id.* at 70 ("A full jurisdictional claim is based on the power of the profession's abstract knowledge to define and solve a certain set of problems.")

thus to control the market for treatment—according to their own abstract knowledge systems:

> At first [alcoholism was] a moral and spiritual problem; ministers were the relevant experts. The doctors soon attacked, substituting the claim of cure for the clergyman's mere condemnation and forgiveness. In the late nineteenth century, the problem was pronounced a legal one, although the lawyers and the police dealt with alcoholism simply by incarcerating it. The psychiatrists also claimed alcoholism in this period.[168]

A second, and complementary, form of control involves the *codification of abstract knowledge*. Codification, or rule making, allows professions to delegate work to subordinate professions while maintaining control over the abstract principles that create those rules.[169] Codification allows expert communities to expand their jurisdiction by enlisting other—subordinate—communities to render services under the dominant expert community's supervision.[170] For example, doctors have delegated the provision of on-site emergency aid (or prehospital aid) to paramedics, whose conduct is regulated by the "Basic Life Support Guidelines" and "Advanced Life Support Guidelines."[171] As a general rule, deviation from these guidelines requires direct medical oversight, thus sharply reducing paramedic discretion.[172]

Codification of expert knowledge, however, also makes knowledge more accessible to non-specialists and would be expected to ultimately erode specialists' control over that knowledge domain. Indeed, some medical sociologists predict that the use of information systems to monitor medical examinations, assist with diagnosis, and direct treatment plans would lead to

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[168] *Id.* at 37. A more recent iteration of this type of competition is between "scientific psychiatry," embodied in the DSM manual, and "psychoanalysis" for the treatment of mental illness. *See, e.g.,* STUART A. KIRK & HERB HUTCHINS, THE SELLING OF DSM 11 (1992) ("Psychologists have been among the most vociferous critics [of the DSM]. They worried that the DSM-III was an attempt by psychiatrists to medicalize more human problems, laying claim by professional territory that was being hotly contested by them and others.").

[169] *See* Abbot *supra* note ___, at 72 ("The direct creation of subordinate groups has great advantages for the professions with full jurisdiction. It enables extension of dominant effort without division of dominant prerequisites.").

[170] This particular role for rules as devices to control subordinate communities aligns most closely with traditional principal-agent models of judicial decision-making, in which principals use rules to constrain their agents' discretion. *See, e.g.,* Tonja Jacobi & Emerson Tiller, *Legal Doctrine and Political Control*, 23 J. L. ECON. & ORG. 326, 339 (2007) (modeling a higher court's choice of clear rules or flexible standards on the level of political alignment between the two courts, with higher political alignment resulting in a choice of standards and viceversa).

[171] *See, e.g.,* Stamford Hospital, *Advanced Clinical Care Guidelines, Policies and Procedures*, http://www.stamfordems.org/Library/2012%20Adult%20and%20Pedi%20Treatment%20Guidelines.pdf; ERC Guidelines Writing Group, *European Resuscitation Council Guidelines for Resuscitation 2010*, 81 RESUSCITATION 1219–1276 (2010).

[172] Stamford Hospital, *supra* note ___ at 4.

a considerable erosion of physicians' power and autonomy.[173] But just as complete codification of expert knowledge would erode jurisdictional control, so would absolute abstraction. Jurisdictional control requires an optimal balance between codification and abstraction.[174] Abstract knowledge that remains completely inaccessible to the lay public precludes the public from evaluating the effectiveness of the expert community's claims, especially if that community also controls the tests that evaluate effectiveness itself. Absolute abstraction demands absolute trust in individual members of the profession as possessing the required, inaccessible expertise to solve the relevant problems. Therefore, codification also serves to legitimate a professional claim to effective treatment by giving a glimpse to the lay public of its claims to expertise through a simplified, rule-based version of the experts' knowledge.[175]

For example, sociologists of medicine argue that the DSM—a manual that codifies mental health diagnostic categories—was developed to address "the [psychiatric] profession's self doubts and its vulnerability to public and scientific criticism."[176] Similarly, the turn towards the standardization of medical care was made, at least in part, to address a legitimacy crisis.[177] A series of studies documented wide divergences in the medical treatments offered to similarly situated patients, undermining the credibility of health care practitioners.[178] The solution adopted by the medical profession was to convene expert medical panels to draft rule-like clinical practice guidelines for a range of medical procedures, based on the best available scientific evidence.[179] In this case, however, codification reduced the discretion of members *within* the expert group, not just the discretion of members of subordinate professions. Because the adoption of guidelines limited doctors' ability to rely on their intuition based on practice experience, they have

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[173] John D. Stoeckle, *Reflections on Modern Doctoring,* 66 MILLBANK QUARTERLY 76 (1988). Similarly, several legal scholars predict that information systems, allowing for the proliferation of low-cost, do-it-yourself court filings, would erode lawyers' control over the provision of legal services. *See, e.g., Richard Marcus, The Impact of Computers on the Legal Profession: Evolution or Revolution?* 102 NW. U. L. REV. 1827 (2008) (listing sources).

[174] Abbott *supra* note ___at ___ ("Professions cannot afford to invoke either too much or too little inference. Too little makes their work seem not worth professionalizing. Too much makes their work impossible to legitimate. In either case, jurisdiction is weakened.")

[175] *See, e.g.,* PORTER *supra* note ___, at 4 ("Mechanical objectivity . . . has a powerful appeal to the wider public. It implies personal restraint. It means following the rules."); Abbott *supra* note ___at 60 ("By revealing to the public some of its professional terminology and insights, a profession attracts public sympathy to its own definition of tasks and its own approach to solving them.").

[176] Kirk & Hutchins, *supra* note ___, at 13.

[177] *See, e.g.,* Stefan Timmermans & Emily Kolker, *Evidence-Based Medicine and the Reconfiguration of Medical Knowledge*, 45 J. HEALTH AND SOCIAL BEHAVIOR, 177, 177 (2004).

[178] *See, e.g.,* JOHN E. WENNBERG, THE DARTMOUTH ATLAS OF HEALTH CARE (1999) (mapping the frequency and variety of surgical interventions by geographical area to similarly situated patients); Sackett, David L., William M. C. Rosenberg, J. A. Gray, Brian R. Haynes, and W. Scott Richardson. *Evidence-based Medicine: What It Is and What It Isn't*, 312 BRIT. MED. J. 71-72 (1996).

[179] *See* Timmermans & Kolker, *supra* note ___, at 181.

proved controversial.[180] Indeed, several studies have found that only a minority of doctors complies with guidelines in their field, despite being familiar with them.[181]

Because codification serves to restore the public's trust in the objectivity and reliability of expert judgment, expert communities that enjoy a low level of public trust—what historian of science Theodore Porter calls "weak communities"—are expected to rely on inflexible rules most often.[182] Expert communities can be "weak" either when they lack legitimacy in the eyes of external audiences or when there is a high level of internal dissent (which in turn can lead to low levels of external trust).[183] Rules can also help manage internal dissent by reducing variability and uncertainty in weak communities without widely shared background assumptions.[184]

Taken together, these studies present a more nuanced picture of the multiple reasons why an expert community may resort to rules. Rules can be an instrument of control, but they can also serve to provide external legitimacy and to manage communities fractured by internal dissent.

Professions use abstract knowledge to classify and offer solutions for tasks and problems. But there is no single or best way to conceptualize a problem. For example, alcoholism can be conceptualized as a mental disorder fit for psychological treatment (an impulse control problem),[185] as a physical problem requiring medical intervention (a neurotransmitter imbalance problem),[186] or as a legal problem requiring regulation (a behavior that disrupts the social order).[187] The act of classifying a problem creates the arena where jurisdictional struggles take place. The next subsection addresses this "classification problem" and its implications for professional competition.

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[180] *Id.* at 186.
[181] *Id.*
[182] Porter *supra* note___, at 229-30 (noting that recourse to inflexible rules is most salient in scientific communities that are poorly insulated from public criticism)
[183] *Id.* at 226-228 (arguing that "theoretical agreement contributes greatly to the stability of experimental communities." Thesecommunities tend to resort to rigid rules when consensus breaks down or in new fields "without widely shared assumptions and meanings").
[184] *Id.* at 228 ("[T]he relative rigidity of rules for composing papers, analyzing date, even formulating theory, ought to be understood in part as a way of generating shared discourse, of unifying a weak research community.").
[185] *See, e.g.,* JEROME D. LEVIN, TREATMENT OF ALCOHOLISM AND OTHER ADDICTIONS: A SELF-PSYCHOLOGY APPROACH (1987) (claiming to provide "psychotherapists and counselors who treat alcoholism and other addictive states with a solid understanding of the inner world of their patients, the dynamics of these disorders, and a repertoire of therapeutic interventions to improve the effectiveness of their psychotherapy.").
[186] *See, e.g.,* C. Fernando Valenzuela, *Alcohol and Neurotransmitter Interactions*, 21 ALCOHOL HEALTH & RES. WORLD (1997).
[187] *See, e.g.,* JOSEPH R. GUSFIELD, SYMBOLIC CRUSADE: STATUS, POLITICS AND THE AMERICAN TEMPERANCE MOVEMENT 119 (1963) ("It was a fact of life [following the passage of the Eighteenth Amendment] that liquor, beer, and wine were sold covertly and not openly; that public exposure of evasion might force fines or jail or both.").

3. Competing Framings of Tasks and Problems

Tasks can be conceptualized as having both objective and subjective elements, although the precise line between the two is often hard to draw. Objective qualities are features of a problem that are so broadly agreed upon as constitutive of a problem that they come to represent fixed characteristics that are not easily reinterpreted.[188] The most obvious objective quality of a problem is given by its natural or factual characteristics. For example, all the approaches to alcoholism described above were bounded by objective characteristics of alcohol consumption itself, such as loss of fine motor skills, as well as coarse motor skills and sensory function at high consumption levels. Thus, objective qualities of tasks limit jurisdictional expansion by requiring that a profession's definition of a problem remain closely linked to that problem's fixed attributes.

Subjective qualities, on the other hand, are *framings* of a particular problem claimed by a particular profession. Professions compete for jurisdictional control by framing problems as best solved within their abstract knowledge system. For example, alcoholism framed as a mental disorder concerning addiction and impulse control grants primary jurisdictional control over treatment to psychologists or psychiatrists; but framed as a problem involving neurotransmitter hypersensitivity, it grants primary jurisdictional control to physicians.

B. Expertise in Action: Rules versus Contextual (Tacit) Knowledge

A second strand of sociological thought has focused on the interplay between explicit rules of decision and contextual knowledge in both expert training and expert decision-making.[189] The key insight derived from this line of inquiry is that expertise is inextricably linked with tacit knowledge—"inarticulatable skills of which one cannot fully give account"[190]—that make it impossible to fully codify an expert's body of knowledge into a set of written rules (or code).

Nevertheless, rule making plays an important role in accounts of expertise acquisition. Self-conscious following of explicit rules is what enables a novice to begin his or her path towards expertise.[191] But while the novice applies "context free" rules—being incapable of taking into account

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[188] *See, e.g.,* Abbott *supra* note ___, at 38.

[189] *See, e.g.,* HARRY COLLINS, TACIT AND EXPLICIT KNOWLEDGE (2010); HARRY COLLINS & ROBERT EVANS, RETHINKING EXPERTISE (2007); HERBERT DREYFUS & SCOTT DREYFUS, MIND OVER MACHINE: THE POWER OF HUMAN INTUITION AND EXPERTISE IN THE ERA OF THE COMPUTER (1986); Robin Cowan, *Expert systems: aspects of and limitations to the codifiability of knowledge*, 30 RES. POL. 1355, 1356 (2001) (describing the limitations of a computer expert system—*i.e.* computer code designed to simulate expert decision-making).

[190] EVAN SELINGER, EXPERTISE: PHILOSOPHICAL REFLECTIONS 10 (2011) ("[K]nowing how to do something such as . . . recognizing a complex visual pattern [or] producing a coherent and grammatical sentence involves the exercise of inarticulatable skills of which one cannot fully give an account.")

[191] Dreyfus & Dreyfus *supra* note ___, at 21-36.

contextual factors that may require the modification of these rules—an expert not only internalizes but also transcends rules.[192] While a novice slowly and deliberately strives to follow rules, through a "painful" and "jerky" process, an expert experiences "flow" as he/she "unselfconsciously" recognizes complex contextual cues.[193] In fact, experts often tend not to follow the heuristics they relied upon during their training.[194] An expert relates to context in "a fluid way using cues that it is impossible to articulate and that if articulated would usually not correspond, or might even contradict, the rules explained to novices."[195] Thus, a direct consequence of expert intuition is an unavoidable conflict between the rules as explained to novices and their actual application by experts to real-world contexts.

Gaining expertise, however, requires more than following rules that are eventually transcended through repeated practice. Rather, to fully grasp an expert community's knowledge requires "enculturation:" "interactive immersion in the way of life of the [expert] culture."[196] In other words, acquiring expertise requires learning by doing *with* other members of that expert community.[197] One important consequence of locating expertise within the expert community rather than with the individual is that both becoming and continuing to be an "expert" requires embeddedness in the relevant expert community: "expertise can be lost if time is spent away from the group."[198]

Finally, from these studies emerge two additional insights. First, when beginners reach the expert stage they are transformed, not only in their ability to dispense with rules, but also in their affective relationship to their field of expertise.[199] The process of acquiring expertise represents a progression "from relative detachment to engaged commitment."[200] Second, experts will have difficulty communicating with non-experts precisely because non-experts can be likened to novices who only have access to the rules, but not the intuition of the expert community.[201]

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[192] Dreyfus & Dreyfus *supra* note ___, at 21-36.
[193] Dreyfus & Dreyfus *supra* note ___, at 21-36.
[194] Selinger *supra* note ___, at 19 (describing experts as having "acquired and embodied skills that provide the basis for determining whether rule following or intuitive comportment are meaningful guides for acting in the field one becomes expert in.")
[195] Collins & Evans *supra* note ___, at 25.
[196] Collins & Evans *supra* note ___ , at 23, 24.
[197] *See, e.g.,* THOMAS KUHN, STRUCTURE OF SCIENTIFIC REVOLUTIONS 47 (1962) (pointing out that serious science is done only by those who have been well socialized into a body of specialists).
[198] Collins & Evans *supra* note ___, at 3.
[199] Dreyfus & Dreyfus, *supra* note ___, at 19 (According to Dreyfus & Dreyfus, it is this affective transformation following skill acquisition—in addition to tacit knowledge—that differentiates expert communities from computerized expert systems.).
[200] Dreyfus & Dreyfus, *supra* note ___, at 33.
[201] Selinger, *supra* note ___, at 22.

C. Summary

Understanding the behavior of organized groups of experts requires recognizing their unappreciated dynamic of jurisdictional competition for maximal control and autonomy in the development and application of an expert body of knowledge. It also requires an appreciation of the mechanisms through which that competition takes place, including the multiple roles of formal rules as mechanisms of controlling subordinate communities, increasing legitimacy with external audiences, managing internal dissent, and providing expert training.[202] Applying these insights to the Federal Circuit and to specialized courts more broadly, however, necessitates a finely grained understanding of how these various aspects of expert community behavior interact with each other. It also requires adapting these insights to the hierarchical court system. The first step is a more thorough typology of expert community behavior, which the sociological literature has not provided. I address that gap in the next section.

D. A Typology of Features of Expert Communities: The Federal Circuit as a Case Study

1. The Federal Circuit as an Expert Community

Much of the research presented in the previous section studied traditional professional groups—institutions that are largely autonomous from the state, with independent entrance exams, licensure procedures, and ethical guidelines. One crucial question in applying these insights to the Federal Circuit and to specialized courts more broadly is how to translate this research to a different institutional context. In other words, how is a specialized court like the expert communities studied by sociologists, how might it be different, and how might these differences impact behavior predictions that flow from the study of the professions?

Sociologists who study traditional professions already have in mind a broader definition of the term "profession" than how the term is colloquially understood. For example, sociologist Andrew Abbott adopted what he termed a "very loose" definition of "profession" in his work as "somewhat exclusive groups of individuals applying somewhat abstract knowledge to particular cases."[203] And sociologist Gil Eyal argues that jurisdictional competition can take place between "any groups that can lay a claim of expertise."[204] In turn, this suggests that insights derived from the sociology of expertise are applicable to the Federal Circuit, so long as it can be conceptualized as a relatively exclusive group with a claim to expertise in patent law.

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[202] *See infra* Section ___.

[203] Abbott, *supra* note ___, at 318.

[204] Gil Eyal, *For a Sociology of Expertise: The Social Origins of the Autism Epidemic*, 118 AM. J. SOCIOL. 863, 869 (2013). *See also* Gorman & Sandefur, *supra* note ___, at 277 (arguing that "the commonalities between traditional professions and new forms of knowledge-based work [] more important than their differences.").

But does the Federal Circuit have "expertise" in patent law? Answering this question depends on our understanding of what it means to have expertise in a particular subject area. Under a relational view, "expertise" is simply an attribution.[205] Being an expert means that others attribute the quality of expertise to a particular community (or individual) that also views itself (or him/herself) as expert.[206] On the other hand, a substantive view of expertise considers expertise a real, substantive attribute that can lead to "better results" in solving particular social problems.[207] To be an expert means to "know what you are talking about" more than non-experts by some external, objective measure—not simply by convincing others.[208]

Although I take a substantive view of expertise, that is, that experts *can* "know what they are talking about" more than non-experts, this article brackets an analysis of the *content* of expertise, and concerns itself with modeling the behavior of those communities that are considered expert under the broader relational view. This is a crucial first step in a broader project to engage substantively with how to foster the "right" type of expertise. Explaining the behavior of expert communities, whether possessing substantive or only attributed expertise, has clear normative implications insofar as it identifies characteristics of all expert communities that are likely to be normatively undesirable, suggests avenues for addressing them, and points out why some of the current solutions to the "specialization problem" are likely to fail.

Expertise in patent law can be disaggregated at least into three levels. First, the Federal Circuit has particular (attributed) expertise in formulating patent doctrine to fulfill the dual Congressional mandate of uniformity and efficiency.[209] Second, the Federal Circuit has (attributed) special knowledge on how to apply abstract patent doctrine to technical fact patterns. Third, the Federal Circuit has (attributed) technical expertise, which involves an understanding (or at least a comparative advantage vis-à-vis other courts) of the complex and evolving technology often involved in patent litigation.[210] Although it is debatable whether the Federal Circuit judges *in fact* possess the required legal and technical expertise, both Congress and other courts, including the Supreme Court, have *attributed* both types of expertise to the

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[205] *See, e.g.,* Collins & Evans, *supra* note ___, at 2 (describing the "sociology of the acquisition of expert status" as showing that "coming to be called an expert may have little to do with the possession of real and substantive expertise.")
[206] *Id.*
[207] *Id.* at ___.
[208] *Id.* at ___.
[209] H.R.Rep. No. 97-312, pp. 20 (1981).
[210] For example, Daniel Meador, a key figure in the creation of the Federal Circuit, praised its limited subject matter jurisdiction as a means to increase the judges' expertise in that subject area.

Federal Circuit.[211] Importantly, recent empirical studies show that district courts accord the Federal Circuit greater institutional authority in patent law (compared to the Supreme Court) than they accord other circuit courts in copyright law (compared to the Supreme Court).[212] This suggests that District Courts also view the Federal Circuit as deserving of increased deference in issues of patent law, likely by virtue of their relevant expertise. In addition, the Federal Circuit has self-identified as an expert community. For example, the Federal Circuit has often noted that it possesses "special" and "useful" expertise on matters of patent law based in part on the large volume of patent cases it decides.[213]

There are, however, two key differences between the Federal Circuit and the expert groups described in the previous sections: (1) embeddedness in a hierarchical court structure, and (2) high epistemic diversity among members of the court. Because the Federal Circuit is embedded in a hierarchical court structure, it is subject to rules of deference (such as Rule 52a requiring deference to the District Court's findings of fact, or the required deference to Supreme Court holdings) that place limits on its autonomy. In addition, current Federal Circuit judges have no say over new judicial appointments—in contrast to most expert groups that control admittance into their community. Of course, other expert communities are subject to external

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[211] *See, e.g., Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 40 (1997) (noting the Federal Circuit's "special expertise" in patent law); Justice Breyer, Transcript of Oral Argument at 28, *Alice Corp. v. CLS Bank Int'l*, No. 13-298 (describing the Supreme Court decisions in *Mayo v. Prometheus*, 566 U.S. ____ (2012) and *Bilski v. Kappos*, 561 U.S. ____ (2010) as "sketch[ing] an outer shell of the content, hoping that the experts, you and the other lawyers and the . . . circuit court, could fill in a little better than we had done the content of that shell."); Transcript of Oral Argument at 13, *Octane Fitness*, No. 12-1184

> Justice Alito: Sometimes [the Federal Circuit] particularly if it's a very technical case, they speak a different language. They do things differently. The district judge is struggling to figure out how to handle the case. And then . . . the party that wins says, this was an exceptional case and you should award fees in my favor under 285.
>
> And the district judge says: How can I tell if this is exceptional? If I had 25 patent cases, I could make some comparisons. But I don't have a basis for doing that. Now, the *Federal Circuit has a basis for doing it.* [emphasis added]. (Tr. At 13)
>
> Justice Roberts: And why shouldn't we give some deference to the decision of the Court that was set up to develop patent law in an uniform way? They have a much better idea than we do about the consequences of these fee awards in particular cases . . . Why don't [sic] give some deference to their judgment? (Tr. At ___) [

[212] David R. Pekarek-Krohn & Emerson H. Tiller*, Federal Circuit Patent Precedent: An Empirical Study of Institutional Authority and Intellectual Property Ideology*, 2012 WISC. L. REV. 1177, (2012)

[213] *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.,* 234 F.3d 558, 571-72 (Fed. Cir. 2000) (en banc). *See also Control Res., Inc. v. Delta Electronics, Inc.* (D.Mass. 2001) (describing the Federal Circuit as "view[ing] itself as a substantive policy maker, a court with a mission. . . . [with] special expertise."); *Highmark* (denial of rehearing en banc) (The Federal Circuit brings to the table useful expertise. Our court sees far more patent cases than any district court, and is well positioned to recognize those "exceptional" cases in which a litigant could not, under the law, have had a reasonable expectation of success.").

controls as well. For example, medical malpractice law regulates doctors' behavior. And several states have passed laws banning some types of scientific research, such as human reproductive and therapeutic cloning. Nevertheless, the hierarchical structure of the judicial system does not map neatly onto other types of regulation imposed on the expert communities traditionally studied by sociologists.

Second, there is greater diversity in the background and training of Federal Circuit judges (what I term "epistemic diversity") than would be expected of members of traditional professions such as, for example, gynecologists or geneticists. In other words, there is no standard "curriculum" that makes a Federal Circuit judge an expert in patent law.

This level of epistemic diversity among Federal Circuit judges is not completely unheard of in other expert communities. In fact, many expert communities could be subdivided into sub-communities with closer epistemic connections. For example, expert communities of geneticists contain within them communities of human geneticists, mouse geneticists, fruit fly geneticists, and so on. Nevertheless, the epistemic diversity of the Federal Circuit raises the question of whether it can still be considered a coherent, single community. Several lines of argument indicate that the Federal Circuit does indeed behave like a single expert community—albeit one with a high potential for internal dissent and fracture. First, the Federal Circuit sees itself as an institution with a collective "special expertise" in patent law.[214] Second, this self-perception is shared across government actors, including Congress, lower courts, and the Supreme Court.[215] Third, epistemic diversity upon entering the court does not preclude the development of shared norms in the course of making patent decisions. Indeed, an important finding of sociologists of expertise is that communities that work towards a shared goal (in this case, to develop a coherent body of patent law) will tend to develop shared understandings and norms.[216] In this framework, new members of the Federal Circuit are expected to be enculturated into existing Federal Circuit norms. Still, high levels of epistemic diversity are likely to make the Federal Circuit more akin to "weak" expert communities, with high levels of internal dissent.

The typology of Federal Circuit decision-making developed below adapts insights from the sociology of expertise to the context of specialized courts by taking into account both the hierarchical structure in which the court is embedded and the epistemic diversity of the Federal Circuit.

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[214] *See supra* note ___.
[215] *See supra* note ___.
[216] *See, e.g.,* Thomas Gieryn, *Boundaries of Science, in* THE HANDBOOK OF SCIENCE AND TECHNOLOGY STUDIES 393, 412 (Sheila Jasanoff, Gerald E. Markle, James C. Petersen & Trevor Pinch, eds. 1995).

2. Five Features of Expert Communities and Their Application to Federal Circuit Behavior

This section introduces the five features of the typology. Because a concept is often best understood through its application to a particular case, the five categories are briefly described and their details worked out by their application to the Federal Circuit as a case study. Table 1 below summarizes how the five features describe below map onto Federal Circuit behavior.

	Epistemic Autonomy	Epistemic Monopoly	Codification	Typecasting	Inability to self-coordinate
Rule Formalism	X	X	X		
Jurisdictional Expansion	X	X	X		
Lack of Deference	X	X	X		
Defiance	X	X			
"Tunnel Vision"				X	X

Table 1: Mapping the Typology of Expert Decision-Making to Federal Circuit Behavior

a. Epistemic Monopoly and Autonomy

Jurisdictional control requires the twin forces of monopoly and autonomy. *Epistemic monopoly* refers to an expert community's drive to attain *maximal control* over its knowledge base. Monopoly allows control over the *supply* of expertise by placing the expert community as the only source of valid solutions for a particular problem. *Epistemic autonomy* refers to an expert community's independence in defining the significance and relevance of its knowledge base. Autonomy leads to jurisdictional control over the classification and definition of a problem as pertaining to an expert community's sphere of expertise. Epistemological autonomy allows control over the *demand* for expertise by granting an expert community's independence in framing its knowledge base.

An example of how these two forces may be unlinked is illustrative: a government agency could grant *epistemological monopoly* to an expert community to solve problem X but retain *epistemological autonomy* to define precisely what X is and whether X requires the application of the knowledge base of a particular community. Complete jurisdictional control implies control both over the system of knowledge (abstractions) used to solve a particular problem, and the framing of the problem itself as amenable to solution by that particular set of abstractions.

Several consequences follow from an expert community's drive for epistemic monopoly and autonomy. First, epistemic monopoly will lead to resistance to solutions for a particular problem proposed by non-experts in positions of authority—the problem of *defiance*. Second, epistemic monopoly will reduce deference to findings by subordinate non-experts—the problem of *non-deference*. Third, epistemic autonomy is likely to lead to resistance to alternative framings of or solutions for the problems under study that usurp an expert community's ability to address that problem—the problem of *jurisdictional expansion*.

(1) Epistemic Autonomy and Monopoly at the Federal Circuit: Defiance, Non-Deference, and Jurisdictional Expansion

The behavior of the Federal Circuit tracks these three consequences of epistemic monopoly and autonomy.

Defiance

There have been no quantitative empirical studies comparing Federal Circuit disobedience of Supreme Court decisions to disobedience by other circuits,[217] or assessing whether the Federal Circuit is more likely to defy the Supreme Court in its attributed area of expertise (patent law) than in any of the other cases that make up its docket—both of which are predicted by this model. Nevertheless, qualitative evidence suggests this is the case. Indeed, Chief Justice Roberts has remarked on the Federal Circuit's unusual behavior, noting that it seemed an exception to the rule that lower courts generally follow Supreme Court precedent.[218] And a qualitative analysis of Federal Circuit case law reveals a pattern of resistance to implementing Supreme Court decisions overruling Federal Circuit precedent—a pattern consistent with the model's prediction of defiance to decisions by generalist superiors.[219]

For example, in one of the two Supreme Court cases reviewing the Federal Circuit in the 1980s, *Dennison Manufacturing Co. v. Panduit Corp.,* 475 U.S. 809 (1986), the Court remanded the case to the Federal Circuit with explicit instructions to provide an opinion "clearly setting forth" its reasoning on why Rule 52(a) did not mandate deference to the District Court's factual determinations on non obviousness.[220] Following the Court's decision, however, several Federal Circuit cases simply continued applying a de novo standard of review to the entire non obviousness determination.[221]

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[217] A citation study of the Court of Customs and Patent Appeals, which existed alongside appellate courts prior to the creation of the Federal Circuit and heard appeals from PTO denials "consistently cited the Supreme Court at lower rates than did the Courts of Appeals." Laurence Baum, *Specialization and Authority Acceptance: The Supreme Court and Lower Federal Courts*, 47 POL. RES. Q. 693, 700 (1994).

[218] *Carlsbad Tech., Inc. v. HIF Bio, Inc.,* 1295 S.Ct. 1862 (2009).

[219] *See infra* Part ___

[220] *See also* Rai [Engaging Facts] *supra* note ___, at ___ (analyzing *Dennison* and its aftermath).

[221] *See, e.g.,* Uniroyal, Inc. v. Rudkin-Wiley Corp, 837 F. 2d 1044 (Fed. Cir. 1988) (according no deference to the trial court's findings, which were based on its evaluation of expert testimony, that a PHOSITA would have been motivated to combine two prior art references

As discussed in Part I.A.2, in *Dickinson v. Zurko*,[222] a case involving deference to the PTO's findings of fact, the Supreme Court reversed a long line of Federal Circuit precedent holding that the deferential standard of review to agency fact-finding set forth in the APA did not apply to the PTO.[223] Subsequent cases, however, continued to review PTO fact-finding more stringently than required by the APA. They did so by interpreting the APA's "substantial evidence" standard as being more stringent that the "arbitrary and capricious" standard when applied to judicial review of agency fact-finding—in contravention of Supreme Court precedent.[224]

The Federal Circuit's tendency to stray from Supreme Court opinions extends further than cases concerning the proper standard of review of District Court and agency action. As mentioned in Part ___, in *KSR v. Teleflex,* the Supreme Court rejected the Federal Circuit's "teaching, suggestion and motivation test" as the sole rule to determine whether an invention is "obvious" under section 103 of the Patent Act.[225] The Court deemed the Federal Circuit's "rigid approach" at odds with Supreme Court precedent in *Graham v. John Deere Co. of Kansas City,*[226] which called for a flexible, functionalist inquiry.[227] The Court also made clear that a real-life PHOSITA's research would not be limited by explicit teachings or suggestions to combine elements from her own field of discovery.[228] Rather, a PHOSITA would be driven by "design incentives and other market forces" to find solutions to existing problems worked out within the PHOSITA's own field *or a different one*.[229]

KSR had clear implications for the doctrine of analogous arts, which seeks to identify the content of all relevant prior art that would be available to a PHOSITA at the time of invention.[230] At a minimum, it suggested that determining the contours of analogous art requires a case-by-case determination of which sources a PHOSITA would be driven to consult, given existing market forces and design incentives. Nevertheless, and despite dicta in Federal Circuit opinions recognizing that *KSR* modified the analogous art inquiry,[231] the Federal Circuit has adopted a formalistic approach. In fact, in an important analogous art decision announcing a new rule for determining the contours of analogous art, *In re Klein,*[232] the Federal

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to make the invention at issue); Newell Cos. v. Kenney Manufacturing Co., 864 F.2d 757 (Fed. Cir. 1988).

222 527 U.S. 150 (1999).

223 *Id.* at ___.

224 *See, e.g.,* Rai *supra* note ___, at ___.

225 550 U. S. 398, ___ (2007).

226 383 U. S. 1(1966).

227 KSR v. Teleflex, 550 U. S. 398, ___ (2007)

228 *Id.*

229 KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 401 (2007)

230 *See, e.g.,* Pedraza-Fariña *supra* note ___, at ___.

231 616 F.3d 1231, 1238 (Fed. Cir. 2010).

232 647 F.3d 1343 (Fed. Cir. 2011).

Circuit did not even cite *KSR* as relevant authority.[233]

Other recent cases reflect a similar tendency to disregard Supreme Court decisions that strike down long-standing Federal Circuit doctrine. In patentable subject matter, the Federal Circuit all but ignored the Court's instructions on remand in *Association for Molecular Pathology v. Myriad Genetics*[234] to decide the case in light of the Court's decision in *Mayo v. Prometheus.*[235] *Myriad* concerned the patentability of isolated genomic DNA (i.e. DNA extracted from a cell) and cDNA (i.e. the portion of DNA that codes for a protein, which is manufactured in the laboratory). Relying on its "product of nature" doctrine, the Federal Circuit had reasoned in *Myriad* that both genomic and cDNA were patent eligible because the genomic DNA and cDNA molecules obtained by laboratory manipulation were different from those existing in their natural state inside a cell.[236] *Mayo* concerned the patentability of a diagnostic method for adjusting the dosage of a drug to avoid toxicity while preserving therapeutic effectiveness.[237] The method relied upon a finding that concentrations in the blood above a threshold level of certain drug metabolites led to toxicity. The Court in *Mayo* reasoned that the "relationships between the concentration in the blood of certain [] metabolites and the likelihood that the drug dosage will be ineffective or induce harmful side-effects"[238] were patent-ineligible laws of nature.[239]

An application of the reasoning in *Mayo* to *Myriad* could have led the Federal Circuit to focus on the informational content of DNA—a code that gives instructions for translating DNA into a specific protein sequence.[240] If the DNA code is a patent-ineligible law of nature, simply separating the DNA from the genome, using what the Federal Circuit itself characterized as "routine methods," may not have been sufficient under *Mayo* to render genomic DNA patent-eligible.[241] Nevertheless, the Federal Circuit simply declared that *Mayo* was not applicable to the issue of patentability of genomic and cDNA.

The Federal Circuit's interpretation of the Supreme Court's decision in

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[233] *Id.*
[234] 569 US __(2012).
[235] 566 US 10 (2012).
[236] More specifically, the opinion authored by Judge Lourie focused on how isolating genomic DNA required breaking chemical bonds, and how the cDNA molecule did not exist in nature, but had to be synthesized in the laboratory.
[237] *Id.*
[238] *Id.*
[239] *Id.*
[240] The genetic code can be understood as specifying a relationship between triplets of DNA base pair molecules and single proteins. This relationship is not determined by man, but rather represents the (natural) logic that allows the reproduction of all living organisms.
[241] The case involved both cDNA and genomic DNA claims. *Mayo:* "We find that the process claims at issue here do not satisfy these conditions. In particular, the steps in the claimed processes (apart from the natural laws themselves) involve well-understood, routine, conventional activity previously engaged in by researchers in the field."

Gunn v. Minton[242] is another example of Federal Circuit defiance. In *Gunn*, the Supreme Court reversed the Federal Circuit's interpretation of its own jurisdiction as encompassing virtually any state law claim that raised issues of patent validity, enforceability, or infringement.[243] Nevertheless, the Federal Circuit has already suggested that the *Minton* decision should be interpreted narrowly, thus preserving much of its previous jurisdictional case law.[244]

Non-Deference

As discussed in Part ___, the Federal Circuit has arrogated power over facts, or construed mixed questions of law and fact as questions of law, issues on which Appellate Courts traditionally grant deference to District Courts. This model complements existing explanations of Federal Circuit behavior that attribute its lack of deference simply to the Federal Circuit's better judgment on or knowledge of patent issues.[245] If superior understanding of how to apply patent law to particular technological area were the only factor driving this lack of deference, one may expect the Federal Circuit to follow the general rule of deference to trial courts on factual matters but make reasoned, case-by-case corrections when its understanding of the technology or reliability of expert testimony differed from that of the District Court. Instead, the Federal Circuit has resorted to blanket rules of non- or reduced deference that increase its monopoly on decisional authority, and allow it to avoid having to give explanations for deviating from a trial court's interpretation of expert testimony. Indeed, it is telling that the Federal Circuit has been most resistant to show deference to District Courts on claim construction—an issue that is often outcome-determinative of all other questions in a patent case.[246]

The Federal Circuit's lack of deference to trial courts on issues of patent law stands in sharp contrast to the court's non-patent decisions, which are characterized by high affirmance rates and deferential standards of review.[247]

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242 133 S. Ct. 1059 (2013).
243 *Gunn v. Minton*, 133 S. Ct. 1059 (2013).
244 *Forrester Envt'l Servs., Inc. v. Wheelabrator Techs., Inc.*, 715 F.3d 1329, 1334 (Fed. Cir. 2013) (noting that much of the Federal Circuit's jurisdictional case law "may well have survived the Supreme Court's decision in *Gunn*").
245 *See, e.g.,* Of course, most claims to epistemic monopoly are rooted in a belief by the expert community that it possesses the best substantive expertise to address the problems at issue.
246 *See, e.g.,* Oskar Liivak, *Rescuing the Invention from the Cult of the Claim*, 42 SETON HALL L. REV. 1,7 (2012) ("[E]very substantive aspect of patent law is controlled by the claims."); Giles S. Rich, *Extent of Protection and Interpretation of Claims-American Perspectives*, 21 INT'L REV. INDUS. PROP. & COPYRIGHT L. 497, 499 (1990) ("The claim is the name of the game."). *See also* Craig Allen Nard, *A Theory of Claim* Interpretation, 14 HARV. J. L. & TECH. 1, 9 (2000) (noting that it is difficult to reconcile the Federal Circuit's de novo review of claim construction with its mandate to promote uniformity and certainty).
247 *See* Ted L. Field, *"Judicial Hyperactivity" in the Federal Circuit: An Empirical Study*, 46 U.S.F. L. REV. 721, 759-63 (2012) (reporting a 28.8 percent reversal rate in patent cases and a 14.3 percent reversal rate in nonpatent cases); James D. Ridgway, *Changing Voices in a Familiar Conversation About Rules vs. Standards: Veterans Law at the Federal Circuit in 2011,* AM. U. L. REV. 1175, 1224 (2012).

Patent law scholars have relied on theories of institutional design of administrative agencies to explain the Federal Circuit's disparate treatment of patent and non-patent cases.[248] Specifically, these theories predict that agencies with multiple tasks will tend to give prominence to one of those tasks due to "agency culture, history, monitoring difficulties, and political concerns."[249] Under this view, the Federal Circuit expands its jurisdiction on issues central to its core mission, but surrenders it on peripheral issues.[250] This model offers an alternative, yet complementary, explanation: the Federal Circuit's unique behavior in the area of patent law flows from its attributed expertise in the subject.

Jurisdictional Expansion

The feature of epistemic autonomy predicts that the Federal Circuit will tend to frame cases that involve other bodies of law (such as state and antitrust law) but that have a patent law component, as primarily about patent law—ultimately resulting in jurisdictional expansion. An extensive scholarly literature on patent law federalism supports this prediction.[251] For example, Shubha Ghosh argues that the Federal Circuit has appropriated jurisdiction over state contract law by creating its own federal common law of contracts.[252] Similarly, the Federal Circuit has interpreted its Congressional grant of jurisdictional as encompassing any state law claim that simply requires the application of patent law.[253] Paul Gugliuzza argues that this expansive interpretation is contrary to Supreme Court precedent, which granted the Federal Circuit a narrower jurisdiction over state law claims, arising only when those claims raised pure issues of patent law.[254] And antitrust scholars have repeatedly criticized the Federal Circuit for "increasing the scope of its exclusive jurisdiction to decide appeals of antitrust and other non-patent claims that implicate issues of patent law."[255]

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[248] *See, e.g.,* Paul R. Gugliuzza, *The Federal Circuit As A Federal Court*, 54 WM. & MARY L. REV. 1791 (2013)
[249] *Id.* at 1799.
[250] *Id.*
[251] *See, e.g.,* Shubha Ghosh, *Short-Circuiting Contract Law: The Federal Circuit's Contract Law Jurisprudence and IP Federalism*, (February 12, 2014), *available at* SSRN: http://ssrn.com/abstract=2390214; Gugliuzza, [Fed. Cir. as Fed. Court] *supra* note ___; Camilla A. Hrdy, *State Patent Laws in the Age of Laissez Faire*, 28 BERKELEY TECH. L.J. 45, 47 (2013); Xuan-Thao Nguyen, *Dynamic Federalism and Patent Law Reform*, 85 IND. L.J. 449 (2010); Mark A. Lemley, *Beyond Preemption: The Law and Policy of Intellectual Property Licensing*, 87 CAL. L. REV. 111 (1999); Paul Heald, *Federal Intellectual Property Law and the Economics of Preemption*, 76 IOWA L. REV. 959 (1991)
[252] Ghosh, *supra* note ___, at 3.
[253] Gugliuzza [Patent Law Federalism] *supra* note ___ at 30.
[254] *Id.* at ___.
[255] Scott Stempel & John F. Terzaken III, *Casting a Long IP Shadow over Antitrust Jurisprudence: The Federal Circuit's Expanding Jurisdictional Reach*, 69 ANTITRUST L.J. 711, 711 (2002); *see also* Ronald S. Katz & Adam J. Safer, *In Ruling on Antitrust, Does Fed. Circuit Overstep?,* NAT'L L.J., Oct. 16, 2000, at C20; Robert Pitofsky, *Challenges of the New Economy: Issues at the Intersection of Antitrust and Intellectual Property*, 68 ANTITRUST L.J. 913 (2001); Ronald S. Katz & Adam J. Safer, *Should One Patent Court Be Making Antitrust Law for the Whole Country?* 69 ANTITRUST L.J. 687 (2002).

Finally, the drive to maintain maximal control and to displace alternative framings of a problem also plays out through competition with other expert communities. In the area of patent law, the Federal Circuit, the PTO and the ITC would be expected to compete with each other to gain maximal monopoly and autonomy in the design and application of patent law. Competition between expert communities can take different forms, depending on the tools available to those communities to maintain and expand their epistemic monopoly and autonomy. Codification (or rule-making), however, remains one of the most powerful mechanisms whereby a superior expert community can both delegate authority to a subordinate expert community and control how that authority is exercised. The role of codification, and its impact on the relationship between the Federal Circuit and the PTO, is explored in depth in the next section.

But codification is not the only means of competition. The Federal Circuit has used additional strategies to avoid according deference to the PTO—from refusing to recognize the existence of factual disputes to applying a more stringent standard of review than that mandated by the APA.[256] On its part, the PTO has been keen on expanding its influence over patent law and policy, challenging the Federal Circuit's power at the Supreme Court and, more quietly, simply refusing to apply Federal Circuit guidelines—providing further evidence of the competitive relationship between these two communities.[257]

b. Codification

All communities of experts strive to codify into written rules at least part of their abstract knowledge base. Sections ___ and ___ above outlined the four interrelated purposes of codification by an expert community: (1) teaching; (2) delegation and control; (3) legitimation; (4) managing internal dissent.

These features of codification, however, need to be modified to take into account both the hierarchical structure in which the Federal Circuit is embedded and the epistemic diversity of the Federal Circuit. First, court hierarchy may introduce a paradox that is not traditionally present in other expert communities, in which members of the expert group are free to

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[256] *See supra* note ___.

[257] *See, e.g.,* Long *supra* note ___, at___ ("The PTO has been vying to gain more influence in the market for supplying legal rules and norms."); Craig Allen Nard, *Deference, Defiance and the Useful Arts*, Ohio St. L. J. ("[T]he PTO, as of late, has displayed an independent temperament, at times to the point of defiance, and has argued for greater deference with respect to its patentability decisions and interpretations of various provisions of the patent code."). Clarissa Long describes the emergence of the PTO as a powerful institutional player, and characterizes its relationship with the Federal Circuit as one of competition in the market for influence over patent norms. The account offered here agrees with Long's description of the interaction between these two institutions, but provides a different analytical framework to explain it.

announce rules to guide subordinate—but not expert—behavior.[258] Specifically, rules designed to control or teach subordinates also bind the Federal Circuit, thus preventing it from deploying its own expertise. The Federal Circuit appears to have solved this paradox by often ignoring its own rules, a phenomenon that will be explored in the next section.

Second, the high levels of epistemological diversity characteristic of the Federal Circuit suggest that it will behave like a weak expert community. In turn, as a weak community, this model predicts that the Federal Circuit would resort to rules on issues characterized by high levels of internal dissent. Finally, the technical background of some judges—and the corresponding lack of technical expertise of others—may make technically proficient judges disproportionately influential on issues involving their technological expertise.

(1) Codification and the Federal Circuit: Managing Relationships through Rule Formalism

The codification feature of expert communities explains the Federal Circuit's resort to rules as a key mechanism by which the Federal Circuit manages its relationships with subordinate decision-making bodies, with other relevant audiences, such as the patent bar and the public at large, and among its own members.

Relationships with District Courts and Agencies: Teaching, Delegation, and Control

The Federal Circuit is in a dual relationship with District Courts. On the one hand, the expert Federal Circuit has a *teaching relationship* with generalist District Courts, which can be conceptualized as non-experts in the patent law field. As novices, District Courts need rules to begin to learn the art of making patent law decisions and cannot be trusted to correctly implement standards, or open ended, flexible inquiries.[259] On the other hand, the District Court is a *subordinate community* vis-à-vis the Federal Circuit. In this context, the Federal Circuit can be expected to use codification as a means to both delegate a subset of tasks to District Courts, and to tightly control the exercise of that delegation.

Examples abound of rule development by the Federal Circuit and its admonition to District Courts that rules need to be rigidly implemented. For example, in *KSR* itself, the Federal Circuit chastised the District Court for failing to make specific findings on what "understanding or principle within the knowledge of a skill artisan . . . would have motivated one with no knowledge of [the] invention to make the combination in the manner

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[258] *See, supra* note ___ (explaining the relationship between paramedics and medical doctors).
[259] This view is consistent with recent comments by Justice Alito during oral argument in the case *Octane Fitness* (involving the newest iteration of Federal Circuit control through rigid rules). Justice Alito suggested that the District Court does not have sufficient experience in patent law to be able to judge, without more explicit guidance, whether a patent law case is "exceptional." (Tr. at 13)

claimed."[260] In other words, the Federal Circuit demanded that the District Court make its reasoning explicit, which in practice meant finding prior art of record demonstrating a reason to combine references.[261] The Federal Circuit thus denied the lower court recourse to its own judgment in determining both the skill in the art in the relevant technology and whether an artisan of that skill would have combined the references under consideration. Importantly, finding the level of skill in the art, and elucidating in light of all the factual evidence whether a PHOSITA would have combined the references at issue, is a fact-laden inquiry of the type that District Courts are traditionally in the best position to perform.

The boundary between these twin functions of rules—as teachers, and as instruments of delegation and control—is nor sharply delineated. Using rules to teach implies controlling what tasks are delegated to novices and how those tasks are performed. The key distinction is that the *delegation* and *control* functions of codification take place in the context of a competitive, rather than a mentoring, relationship between communities. Importantly, teaching also implies relinquishing at least some control after learning has taken place.

Disentangling whether the Federal Circuit is acting as a teacher or as a delegator/controller can be quite difficult given their overlap, but one can make some testable predictions as to the likely consequences of Federal Circuit behavior in each one of these roles. First, the teaching function implies that the Federal Circuit will modify its behavior as a function of District Court learning, thus relaxing control by allowing more flexibility in the application of rules. There is some evidence suggesting that the Federal Circuit has increased its deference to District Court decisions,[262] and in particular to decisions by specific District Court judges who have sat with the Federal Circuit,[263] which is consistent with the teaching function of codification.[264]

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[260] *KSR* at ____.

[261] *See, e.g., ACS Hospital Systems, Inc. v. Montefiore Hospital,* 732 F.2d 1572, 1577 (Fed. Cir. 1984); *In re Geiger*, 815 F.2d 686, 688 (Fed. Cir. 1987);

[262] Anderson & Menell *supra* note ___; Petherbridge, *supra* note ___.

[263] Mark A. Lemley & Shawn P. Miller, *If You Can't Beat 'Em, Join 'Em? How Sitting by Designation Affects Judicial Behavior*, (June 12, 2014). Stanford Public Law Working Paper No. 2449349. Available at SSRN: http://ssrn.com/abstract=2449349. For a list of District Court judges who have visited the Federal Circuit from 2006 to 2013 see*: http://www.cafc.uscourts.gov/images/stories/judicial-reports/vjchartforwebsite2006-2013.pdf*

[264] Increased deference to the opinions of fellow expert community members takes place not simply because new expert members "know better" than non-members, but also because they have been socialized into the practices of the expert community and have, as a consequence, gained the trust of their peers. *See, e.g.,* Porter *supra* note ___, at 223 ("Researchers who are not known for conscientious, painstaking attention to detail will need even more decisive results to be taken seriously. And in fact informal judgments of character and reliability are crucial for interpreting their experiments."). Lemley and Miller conclude that it is this increase in trust that accounts for increased deference to District Court judges who sit by designation in the Federal Circuit. *Supra* note ___, at 28.

Second, the tension between teaching and control implies the existence of a tipping point in which greater District Court expertise won't lead to greater Federal Circuit deference, because an expert District Court will become in fact a competitor subordinate expert community. Indeed, the logic of competition (rather than mentoring) is predicted to be most prominent in the Federal Circuit's interactions with other expert communities such as the PTO and the ITC—communities that can claim to have developed their own expert abstract knowledge base in patent law and policy. Rules control the PTO or the ITC by denying them recourse to their own expertise while simultaneously cementing the Federal Circuit's epistemic monopoly over patent policy. Indeed, the Federal Circuit has similarly relied on a rigid interpretation of the TSM test to limit the PTO's ability to use its technical expertise.[265]

The teaching function of codification is consistent with Peter Lee's information-cost theory, which argues that expert communities resort to rules to codify (and simplify) expert knowledge for external, lay consumption. But as shown here, an equally important function of codification is that of a gatekeeper of an expert community's jurisdictional power.

Finally, the delegation/control function gives rise to an important paradox in the context of a court hierarchy. As emphasized in the previous section, the Federal Circuit would be expected to look for ways to free itself from the very rules it created to constrain their subordinates when these rules do not accord with its own intuition and thus limit its own autonomy. Indeed, the Federal Circuit appears to often "break" its own rules. For example, District Court judges have criticized the Federal Circuit for routinely ignoring its own rules in matters of claim construction.[266] Commentators have leveled a similar criticism to the Federal Circuit's choice of law jurisprudence, noting how the court has "inconsistently applied its choice of law rules"[267] or "simply ignore[d] the choice of law rules issue altogether."[268] This paradox also makes a rule-based system much less predictable than would otherwise be anticipated and helps explain why the Federal Circuit has in fact failed to bring uniformity and predictability to its docket.[269]

The degree to which the Federal Circuit will in fact break its own rules when those rules do not accord with its tacit or contextual knowledge,

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265 *See, e.g., In re Lee* 277 F.3d 1338, 1430 (Fed Cir 2002 ("[C]ommon knowledge and common sense even if assumed to derive from the agency's expertise, do not substitute for authority when the law requires authority.").
266 *See, e.g.,* O'Malley, Saris & Whyte, *supra* note ___ at 676 ("Part of the problem [with claim construction] is that, just when you feel like you know the rules, along comes that case that does not seem to follow the rules.").
267 Ted L. Field, *Improving the Federal Circuit's Approach to Choice of Law for Procedural Matters in Patent Cases*, 16 GEO. MASON L. REV. 643, 645 (2009)
268 *Id.* at 653.
269 *See, e.g,* Guggliuzza, *supra* note ___, at (noting that the Federal Circuit has failed to bring predictability to patent appeals).

however, will depend on the extent to which rules also serve to manage internal dissent or secure external legitimacy—a role which is more important in weak expert communities.[270] These two additional functions require that experts themselves abide by their rules and provide clear explanations when they choose to deviate from them.

The "rules vs. standards" debate in the legal literature has not generally considered these two additional functions of rules.[271] The next section begins to fill this gap by applying these two features of codification to Federal Circuit behavior.

External Relationships: Seeking Legitimacy Through Rules

To generate demand for their services and acceptance of their diagnoses and treatments, expert communities require sociological legitimacy from relevant audiences.[272] Sociological legitimacy refers to the acceptance (by the public at large, or by specific relevant audiences) of a particular expert community's authority in its area of expertise, based on reasons other than fear of sanctions or expectations of personal gain.[273] Expert communities with low levels of sociological legitimacy are expected to rely on codified, rule-like procedures that make diagnoses and treatments more mechanical and transparent, and less reliant on an expert's tacit knowledge.[274] In contrast, expert communities that enjoy high levels of sociological legitimacy (and thus higher levels of trust) can rely more heavily on tacit or uncodified contextual knowledge.[275]

The Federal Circuit was created to bring consistency and expertise to patent law, which many believed was crippled by widely divergent standards of patentability among circuits and rampant forum-shopping.[276] Although

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[270] *See infra* Part ___.

[271] *See, e.g.,* Russell B. Korobkin, *Behavioral Analysis and Legal Form: Rules vs. Standards Revisited*, 79 OR. L. REV. 23 (2000); Louis Kaplow, *Rules Versus Standards: An Economic Analysis,* 42 DUKE L.J. 557 (1992); Eric A. Posner, *Standards, Rules, and Social Norms*, 21 HARV. J. L. & PUB. POL'Y 101 (1997); Pierre Schlag, *Rules and Standards*, 33 UCLA L. Rev. 379 (1985); Kathleen M. Sullivan, *The Justice of Rules and Standards*, 106 HARV. L. REV. 22 (1992a); Dan L. Burk, *Legal and Technical Standards in Digital Rights Management Technology*, 74 FORDHAM L. REV. 537 (2005)

[272] *Id.*

[273] *See, e.g.,* Richard H. Fallon, Jr., *Legitimacy and the Constitution,* 118 HARV. L. REV. 1787, 1795 (2005).

[274] *See, e.g.,* Porter *supra* note ___, at 226-28.

[275] *Id.* at 220 ("Arguments within a [strong] community of specialists can be made with a minimum of formality, only a modest concern for rigor, and with frequent recourse to shared, often tacit knowledge.").

[276] *See*, *e.g.,* Howard T. Markey, *The Federal Circuit and Congressional Intent*, 2 FED. CIR. B.J. 303, 303 (1992) (describing Congress's "expert intent" that the Federal Circuit "contribute to increased uniformity and reliability in the field of patent law"); Charles Shifley, *Flawed or Flawless: Twenty Years of the Federal Circuit Court of Appeals*, 2 J. MARSHALL REV. INTELL. PROP. L. 178, 180 (2003) ("The Federal Circuit's panel conflicts pale in comparison to the conflicts that the patent law had before creation of the Court, and the conflicts the law would likely now have if left to the regional circuits.").

during the first decade of its existence, members of the patent bar and academic commentators generally agreed that the Federal Circuit was succeeding in bringing uniformity and predictability to patent law,[277] criticism began to mount in the late 1990s.[278] Specifically, several commentators blamed the Federal Circuit for inconsistent, panel-dependent opinions that failed to bring uniformity to patent law.[279] The Federal Circuit's turn to rule formalism closely followed these waves of critiques.[280] This is consistent with the hypothesis that rule formalism was (at east in part) a response to a crisis in sociological legitimacy—much like the DSM is thought to have been developed to address psychology's vulnerability to public and scientific criticism.[281]

Internal Relationships: Managing Dissent

Sociological studies of expertise indicate that experts—who have an "engaged commitment" to their area of expertise—are more prone than novices to develop and defend their individual opinions in the face of disagreement.[282] In turn, this suggests that expert judges will be less prone to follow the norm of "consensus" that is theorized to limit dissenting panel opinions.[283] The Federal Circuit's epistemic diversity is likely to make this expert court even more prone to disagreement among its members than expert communities that share a common technical background that includes many years of education and socialization into a discipline.[284]

Empirical studies of the Federal Circuit have shown that it dissents significantly more often than other circuit courts on issues of patent law—but not on other issues under its jurisdiction.[285] And disagreement appears to be growing: Jason Rantanen and Lee Petherbridge have shown that

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[277] *See, e.g.,* Dreyfus, *supra* note ___, at 74 ("On the whole, the CAFC experiment has worked well for patent law . . . .").
[278] *See, e.g.,* Victoria Slind-Flor, *Federal Circuit Judged Flawed*, Nat'l L.J., Aug 3, 1998
[279] *Id.* at ___ ("[M]any members of the intellectual property bar . . . accuse the . . . court of unpredictability, claiming that results are often panel-dependent . . .").
[280] *See* Thomas *supra* note ___, at ___ (describing the rise of adjudicative rule formalism at the Federal Circuit in the late 1990s).
[281] *See* infra Part ___.
[282] *See* infra Part ___.
[283] *See, e.g.,* Joshua Fischman, *Estimating Preferences of Circuit Judges: A Model of Consensus Voting*, 54 J. L. & ECON. 781 (2011) (including a "cost of dissent" in the judicial utility function to account for the social norm of consensus in three-judge federal circuit panels).
[284] *See, e.g.,* Porter *supra* note ___, at 222 (describing the community of high-energy physicists as "remarkably homogeneous, not only in scientific commitments, but even in terms of personal habits, mannerisms, and dress").
[285] Christopher A. Cotropia, *Determining Uniformity Within the Federal Circuit by Measuring Dissent and En Banc Review*, 43 LOY . L.A. L. REV . 801, 815 (2010) (finding that Federal Circuit judges had a 9.28% dissent rate in patent opinions between 1998 and 2009, while other circuits had a significantly lower rate, ranging from 1.14% to 4.56%, and comparable to the Federal Circuit's dissent rate of 3.51% across all subject areas).

unanimous decision rates have fallen from more than 80% of all opinions to only 60% in the period between 2005 to 2013.[286]

These results support the hypothesis that the Federal Circuit is a "weak" expert community with mounting internal divisions in the area of its expertise. Thus, much like the "weak" expert communities studied by sociologists of expertise, the Federal Circuit would be expected to resort to rule formalism as a mechanism to cure or minimize internal divisions. More specifically, if the prediction that rules serve as a tool to manage internal disagreement holds for the Federal Circuit, one would expect, first, that rules be more prominent in particularly divisive issues and, second, that overall reliance on rules versus loose standards would increase with mounting disagreement.

The empirical studies carried out to-date do not precisely address these two predictions. These studies do not include the pre-1998 period in which the Federal Circuit enjoyed relatively high levels of sociological legitimacy, and do not attempt to measure the prevalence of rules vs. standards. Nevertheless, qualitative evidence is consistent with this explanatory framework. The Federal Circuit's tendency to develop rules is particularly salient on issues that have generated a great deal of internal disagreement, such as patentable subject matter or claim construction.[287] And rule formalism did not emerge as a dominant method of decision until 1998. There is reason to believe that the pre-1998 Federal Circuit—which had a relatively stable membership since its inception—had fewer internal divisions than the current Federal Circuit, which has a significant percentage of newcomers.

One final, important feature of codification bears emphasizing: jurisdictional control requires an optimal balance between codification and abstraction. Codification can allow for delegation, increase legitimacy, and manage internal dissent but at the cost of reducing expert autonomy and discretion. And complete codification of expert skills makes expertise irrelevant in the performance of those tasks. For an expert court, extensive reliance on rules can lead external audiences to question the need for expertise. In this context, the Supreme Court's insistence that the Federal Circuit employ flexible standards,[288] and its description of its own role in patent law as providing an "outer shell"[289] to be filled out by the Federal Circuit's expertise, could be understood as a call for the Federal Circuit to

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[286] Jason Rantanen & Lee Petherbridge, *Disuniformity*, (January 24, 2014). U Iowa Legal Studies Research Paper No. 13-42; Loyola-LA Legal Studies Paper No. 2013-39. Available at SSRN: http://ssrn.com/abstract=2351993.

[287] *See infra* Part ___.

[288] *See, e.g.,* Lee *supra* note ___, at 46 (arguing that the Supreme Court's interventions in patent law call for "holism and contextual engagement," in contrast with the Federal Circuit's preference for inflexible rules).

[289] Justice Breyer, Transcript of Oral Argument at 28, *Alice Corp. v. CLS Bank Int'l*, No. 13-298.

return to a more active use of its expertise—that is, its contextual, tacit knowledge of patent law and technology.

These four features of codification present a more complex and nuanced view of how an expert community, and the Federal Circuit in particular, uses rules as a mechanism of jurisdictional competition. Disentangling whether a particular rule serves to teach, control, legitimate, or cure internal divisions is a complicated task—in part because a rule can serve all of these functions simultaneously, and in part because the change over time from standards to rules (or viceversa) is difficult to operationalize empirically. Further empirical analysis can serve to more rigorously test these multiple functions of rules in an expert court. For example, one could measure whether a court is more likely to prefer bright-line rules over flexible, indeterminate tests in periods of high-judge turnover, or in periods with the greatest epistemic diversity among judges. Internal comparisons between the patent and non-patent docket with respect to the court's tendency to rely on rules would also be informative. So would horizontal comparisons with other expert courts, such as those of bankruptcy and tax (although their different position in the judicial hierarchy complicates the interpretation of any data).

c. Typecasting

Typecasting captures the role of *framing* in problem-classification and -analysis by expert communities. As Part ___ emphasizes, the subjective aspects of a problem enable different communities of experts to frame a problem as best solved by the specific abstract system of their particular community. In the context of jurisdictional competition, framing is a tool that allows a community of experts to both defend and expand its jurisdiction.

But an expert community's abstract knowledge system also constrains that community's available framings.[290] For example, in fixing a broken bone, doctors are constrained by their abstract knowledge system to conceptualize a broken bone as an ailment of the human body, and to look for solutions and analogies in medical textbooks, not in engineering manuals.[291] Expert communities *typecast* a particular problem as similar to other problems already solved within their abstract knowledge system, and thus amenable to the same type of solutions.

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[290] *See supra* Part ___; *see also* Steven Shapin, *Here and Everywhere: Sociology of Scientific Knowledge*, 21 ANN. REV. SOC. 289, 292 (1995) (arguing that knowledge acquisition and concept-application is bounded by the "existing structure of knowledge given . . . by their community and within a structure of purposes sustained by their community.").

[291] *See, e.g.,* Anne Eisenberg, *Replacement Bones, Grown to order in the lab,* N.Y. Times (May 27, 2010); *see also* Pedraza-Fariña, *supra* note ___ at 847 (describing resistance from engineers, biologists and funding institutions to an approach to biology that incorporated insights from engineering).

d. Typecasting at the Federal Circuit: Tunnel Vision Revisited

Consider the following two examples in the evolution of patent law jurisprudence:

(1) In 1980 the Supreme Court issued a decision, *Diamond v. Chakrabarty*[292], that many believed ushered in the age of biotechnology.[293] In *Chakrabarty*, a divided Court held that living organisms engineered in the laboratory were patent eligible.[294] The unpatentability of microorganisms and of living things more broadly had been a tenet of patent law under the "product of nature" doctrine for at least the previous 40 years.[295] This tenet was widely accepted by the patent and trademark office, biotechnology companies and their lawyers.[296]

How, then, was this tenet challenged? Peculiar to this story is the fact that *Chakrabarty* carried out his research at General Electric—a company traditionally focused on physical technologies.[297] Challenging this long-standing view required a new way of thinking, a new analogy that was readily available to those working with mechanical inventions and within a different patent culture.[298] To engineers and their patent attorneys, accustomed to filing patents on physical technologies, microorganisms manipulated in the laboratory could be analogized to physical products made of different parts.[299] Once this new analogy was articulated, it became possible—and

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[292]*Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

[293]*See, e.g.,* Sally Smith Hughes, *Making Dollars out of DNA: The First Major Patent in Biotechnology and the Commercialization of Molecular Biology, 1974-1980*, 92 ISIS 541, 569 (arguing that *Chakrabarty*was a "critical ruling for commercial biotechnology: the patent system henceforth was to be used for securing property rights on all manner of living organisms and their components.") (2001);Daniel J. Kevles, *AnandaChakrabarty wins a patent: Biotechnology, law, and society*, 1972-1980, 25 HIST. STUD. PHYS. BIOL. SCI. 111, 113 (1994) (noting that the Supreme Court case had "become charged with the social and economic stakes surrounding the swiftly accelerating commercialization of molecular biology, a high-stakes field naturally concerned with the scope of intellectual property rights in living organisms"); GENENTECH: THE BEGINNINGS OF BIOTECH (2011).

[294]447 U.S. at 318.*Diamond v. Chakrabarty*concerned a living organism that had been manipulated in the laboratory so that it was distinct from organisms that could be found in nature. *Id.*

[295] The "product of nature" doctrine, which was long thought to block the patentability of living things, dates back to 1889 when the U.S. Commissioner of Patents rejected the application for a patent on a fiber found in a needle of a pine tree. *Ex Parte Latimer*, 12 Mar 1889, C.D., 46 O.G. 1638, U.S. Patent Office, *Decisions of the Commissioner of Patents and of the United States Courts in Patent Cases . . . 1889* (Washington, D.C., 1890), 1230127.

[296]*See, e.g.,* H. Thorne, *Relation of patent law to natural products*, Patent Office Society, *Journal*, 6 (1923), 23-28.

[297]*Id.* at 114.

[298]Chakrabarty himself credits General Electric's attorney and patent culture with the decision to file a patent application on his microorganism. According to Chakrabarty "companies like major drug firms, long accustomed to the product of nature barrier to patents, would not have filed a patent application on his new bugs." Daniel J. Kevles, *AnandaChakrabarty wins a patent: Biotechnology, law, and society*, 1972-1980, 25 HIST. STUD. PHYS. BIOL. SCI. 111, 117 (1994).

[299]*Id.*

even a matter of simple legal logic—to think of living organisms not as natural products, but as items manufactured out of chemical subunits.[300]

This example does not involve the Federal Circuit as an expert community. It does, however, illustrate that different expert communities (in this case patent attorneys specializing in biotechnology versus those specializing in mechanical products) are bounded by their most readily available framing of a problem. The next example concerns directly the Federal Circuit and the PTO.

(2) Following the Supreme Court's decision in *Diamond v. Chakrabarty*, the PTO began granting patents to isolated DNA sequences[301]—analogizing DNA sequences that had been extracted from an organism to purified chemical compounds, which had long enjoyed patent protection.[302] But DNA, and specifically DNA sequences within a gene, could also be analogized to an information carrier whose main role is to hold and transmit information, rather than participate in chemical reactions.[303] Neither the PTO nor the Federal Circuit appears to have given much consideration to this distinction.[304] Rather, it was the Southern District of New York in its *Myriad* decision that engaged in a discussion of the implications of the information carrier analogy for the patentability of genes. The S.D.N.Y.

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[300] *See, e.g., In re Application of Bergy*, 596 F.2d 952, 974-75 ("The nature and commercial uses of biologically pure cultures of microorganisms like the one defined in Bergy's claim and the modified microorganisms claimed by Chakrabarty are analogous in practical use to inanimate chemical compositions such as reactants, reagents, and catalysts used in chemical industry.").

[301] *See, e.g.,* U.S. Patent 4,370,417, 1026 Official Gazette Pat. Off. **1315** (Jan. **25, 1983)** (claiming DNA sequence for plasminogen activator protein);**U. S.** Patent 4,703,008, 1083 Official Gazette Pat. Off. **2038** (Oct. 27, 1987) (claiming DNA sequence for erythropoietin); **U.S.** Patent 4,713,332, **1085** Official Gazette Pat. Off. 1386 (Dec. **15,** 1987) (claiming DNA sequence for human T cell antigen receptor); **U.S.** Patent 4,757,006, 1092 Official Gazette Pat. Off. **878** (July 12, 1988) (claiming **re-** combinant**vectors** containing DNA sequence for human factor VIII:C).

[302] *See Utility Examination Guidelines*, 66 Fed. Reg. 1092, 1093 (2001) ("Like other chemical compounds, DNA molecules are eligible for patents when isolated from their natural state and purified or when synthesized in a laboratory from chemical starting materials.").*See also Amgen Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d. 1200, 1206 (Fed. Cir. 1991) ("A gene is a chemical compound, albeit a complex one").

[303] *See, e.g.,* Rebecca S. Eisenberg, *How Can You Patent Genes?* 2 AM. J. BIOETHICS 3, 9 (2002) ("The DNA molecule itself may be thought of as a tangible storage medium for information about the structure of proteins.")

[304] *See, e.g., Ass'nMolec. Pathol. v. Myriad Genetics, Inc.*, 689 F.3d 1303, ("It is undisputed that Myriad's claimed isolated DNAs exist in a distinctive chemical form—as distinctive chemical molecules—from DNAs in the human body, *i.e.* native DNA. . . . Isolated DNA . . . is a free-standing portion of a larger, natural DNA molecule. Isolated DNA has been cleaved (i.e. had covalent bonds in its backbone chemically severed) or synthesized to consist of just a fraction of a naturally occurring DNA molecule.");*Utility Examination Guidelines*, 66 Fed. Reg. 1092, 1093 (2001) ("A DNA sequence . . . is simply one of the properties of a DNA molecule. Like any descriptive property, a DNA sequence itself is not patentable. A purified DNA *molecule* isolated from its natural environment, on the other hand, is a chemical compound and is patentable if all the statutory requirements are met.").

concluded that the DNA-as- information-carrier analogy rendered isolated genes unpatentable products of nature.[305]

The Federal Circuit considered the *Myriad* case twice—once on appeal from the Southern District of New York and again on remand from the Supreme Court, which instructed the Federal Circuit to reconsider the case in light of its decision in *Mayo v. Prometheus*.[306]

As emphasized in Part ___, an application of the reasoning in *Mayo* to *Myriad* could have led the CAFC to focus on the informational content of DNA—a code that translates DNA into a specific protein sequence.[307] Nevertheless, Judge Lourie focused on the molecular structure of genomic DNA, framing DNA as a molecule with a "distinctive chemical structure and identity from those found in nature," rather than an information carrier.[308] Under this framing, Judge Lourie concluded, "*Mayo* does not control the question of patent eligibility."[309] Isolated DNA is not a "product of nature" because it "exists in a distinctive chemical form—as distinctive chemical molecules—from DNAs in the human body."[310] Judge Lourie holds a Ph.D. in Chemistry and it is plausible that his views in this case are shaped and filtered through his previous technical training.[311] Arti Rai has similarly hypothesized that Judge Lourie's obviousness analysis of DNA-based inventions was influenced by his technical background in chemistry.[312]

These two examples also represent two types of typecasting that can operate at the level of the Federal Circuit. The first, professional typecasting, refers to the possibility that the prior professional embeddedness of a judge in a particular community (for example, the patent law community) may

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[305] (concluding that the "defining characteristic" of DNA was its role as a "physical embodiment of information," and that "the preservation of this defining characteristic of DNA in its native and isolated forms mandates the conclusion that the challenged composition claims are directed to unpatentable products of nature.") at 125 "Consequently, the use of simple analogies comparing DNA with chemical compounds previously the subject of patents cannot replace consideration of the distinctive characteristics of DNA.") at 124

[306] *Mayo v. Prometheus*, 566 U.S. ___ (2012)

[307] The genetic code can be understood as specifying a relationship between triplets of DNA base pair molecules and single proteins. This relationship is not determined by man, but rather represents the (natural) logic that allows the reproduction of all living organisms.

[308] "The principal claims of the patents before us no remand relate to isolated DNA molecules. . . . All new chemical or biological molecules, whether made by synthesis or decomposition, are made from natural materials. . . . But, as such, they are different from natural materials even if they are ultimately derived from them. The same is true of isolated DNA molecules." 38-39.

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[311] Arti Rai, *Addressing the Patent Gold Rush* (noting that Judge Lourie has a Ph.D. in Chemistry)

[312] *Id.* 218 n.64 ("The cases that have misconstrued the application of the nonobviousness requirement to DNA were decided by a Judge (judge Lourie) who has a Ph.D. in chemistry.").

influence that judge's interpretation of a problem.[313] The second, technical typecasting, refers to the possibility that the framing of a problem is influenced by previous technical training in a particular field.

3. Inability to self-coordinate across multiple expert areas

This last feature of expert communities combines two insights from the sociology of expertise as embodied intuition and from the sociology of the professions. First, an expert's transformed emotional relationship with his/her area of expertise suggests that issues related to an expert's area of expertise are particularly *personally salient* to experts relative to the general public, and relative to issues in other fields of expertise.[314]In turn, this propensity to care more about (and thus focus more on) an expert's field of study makes it less likely for experts in one area to pay adequate attention to problems and solutions within other areas of expertise. When coordination with other expert areas requires trade-offs—as is the case with patent law and antitrust where, for example, protecting consumers from anti-competitive settlements or practices may require constraining patent entitlements[315]—a community with expertise in one area may place inadequate weight on the competing interests of other expert communities.

Second, competition to fully occupy an expert space (i.e. to attain full control over a jurisdiction)[316]often prevents spontaneous, sustained cooperation among expert communities with different abstract knowledge bases.[317] When such cooperation is required—as is, for example, in "wicked problems"[318] that require action across multiple expertises—it will be difficult

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[313]*Id.*

[314]*See, e.g.,* Howard Levine, John Sullivan, Eugene Borgida& Cynthia Thomsen, *The Relationship of National and Personal Issue Salience to Attitude Accessibility on Foreign and Domestic Policy Issues*, 17 POL. PSY.298 (1996) (defining "personal issue salience" as linked to attitudes that are 'central, ego-involving, . . . and closely linked to the individual's basic values, needs and goals.'"). This is consistent with Judge Posner's observations that a specialized judiciary would "attract persons of somewhat different abilities . . . who are more deeply interested in particular subjects and less interested in running everything."). RICHARD A. POSNER, THE FEDERAL COURTS 250 (1996).

[315]*See, e.g.,* Lemley, *supra* note ___ at ___ ("IP and competition work towards the goal of innovation at cross purposes. Where the two laws do come into contact, then, courts must reconcile the tension between them.").

[316]*See infra* Part ___.

[317]*See* Pedraza-Fariña, *supra* note ___ at 845 (arguing that knowledge exchange among scientific communities' is significantly impaired by individual communities' "resistance to 'outside' tools and interpretive frameworks."). *See also* Gary Becker & Kevin Murphy, *The Division of Labor, Coordination Costs, and Knowledge*___ (describing coordination problems arising from knowledge specialization).

[318]*See,* Horst Rittell& Melvin Webber, *Dilemmas in a general theory of* planning, 4 POL SCI. 155, (1973) (arguing that the specialization of labor and expertise has failed to solve 'wicked problems,' such as poverty, crime, and public education, whose interconnectivity and complexity requires a coordinated approach).

for expert communities to self-coordinate across multiple expert areas. Coordination will likely require external structuring or incentives.[319]

a. Coordination Challenges at the Federal Circuit: A Different Type of Tunnel Vision

Innovation policy has turned out to be a "wicked problem." Incentivizing innovation was one of the key driving forces behind the creation of the Federal Circuit, but patent policy is but a single piece in the mosaic of policies designed to encourage innovation. Thus, knowledge required for fashioning innovation policy that is attentive to the welfare-maximizing balance between patent protection and market competition resides in multiple government institutions.[320] And, as Stuart Benjamin and Arti Rai have recently argued, courts and agencies that regulate innovation are often unaware of each other's solutions to similar problems.[321]

At a fundamental level, coordination challenges concern the organization of knowledge in isolated communities (or isolated institutions).[322] Trans-institutional knowledge is required for developing innovation policy but access to such knowledge is "significantly handicapped by the degree to which [it] resides in increasingly narrow specializations [or institutions]."[323] This represents a second type of tunnel vision—distinct from typecasting.

Coordination difficulties are not only about "lack of awareness" of solutions, but also about preferences for, or emotional attachments to, a particular approach to a problem. In this sense, the "inability to coordinate" and "typecasting" features of expert communities are linked: failure to coordinate may be due to a refusal to accept an alternative framing as valid, or to accord it sufficient weight. Take, for example, the tension between competition law and patent law. In her 1989 analysis of the Federal Circuit's performance in the five years following its creation, Rochelle Dreyfuss pointed out a coordination problem that persists to this day: "If the CAFC is told to encourage invention, but is permitted to see only a small part of the matrix into which patent cases fit [i.e. only patent law] . . . it will undervalue the interest of competitors because it will not have the occasion to consider

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[319] As an example of such incentives, the National Institutes of Health underwrite several grants to promote the formation of interdisciplinary teams. *See, e.g.,* NIAMS Building Interdisciplinary Research Team (BIRT) Revision Awards (R01), http://grants.nih.gov/grants/guide/rfa-files/RFA-AR-13-003.html; Opportunities for Collaborative Research at the NIH Clinical Center (U01) ,http://grants.nih.gov/grants/guide/pa-files/PAR-13-029.html.

[320] *See, e.g.,* Evan Selinger& Thomas Seager, *The Incompatibility of Industrial Age Expertise and Sustainability Science, in* EXPERTISE: PHILOSOPHICAL REFLECTIONS 99, 106 (Evan Selinger, ed., 2011)

[321] Stuart Minor Benjamin &ArtiRai, *Fixing Innovation Policy:A Structural Perspective*, 77 GEO. WASH. L. REV. (2008).

[322] *See, e.g.*, Rai and Benjamin, *supra* note ___ at 19 ("When they actually focus on innovation, government institutions like agencies and courts regulate innovation without having much awareness of what other institutions, faced with similar problems, have done.)

[323] Selinger&Seager, *supra* note ___ at 106.

the role that vigorous competition plays in encouraging invention."[324] Dreyfuss' analysis implied that expanding the Federal Circuit's jurisdiction to include antitrust cases would correct this imbalance.[325] More recently, Paul Gugliuzza took a similar stance in suggesting that replacing some of the Federal Circuit's non-patent docket with commercial disputes may improve the Federal Circuit's understanding of the place of patent law within the broader array of policies designed to incentivize innovation.[326]

The analysis offered here gives reasons to be skeptical that simply allowing the Federal Circuit to decide more cases involving competition law would lead to better coordination between patent and antitrust. In particular, if the Federal Circuit already views itself (and is viewed by outside observers) as having special expertise in *patent* law—it is likely that it will bring its existing expertise and framings to bear onto issues of competition. There is reason to be particularly skeptical of the Federal Circuit's ability to coordinate antitrust and patent law when such coordination requires trade-offs between patent protection and competition. And the Federal Circuit is increasingly applying its own substantive law to antitrust issues that implicate patent law, making the problem of coordination particularly pressing.[327]

For example, following the Federal Circuit's decisions in *In re Independent Service Organizations Antitrust Litigation* (Xerox), *Intergraph*[328], and *C.R. Bar*[329]—which involved antitrust challenges to a monopolist's refusals to license or sell products subject to intellectual property protection—antitrust attorneys uniformly criticized the Federal Circuit for giving undue weight to intellectual property considerations at the expense of competition principles embedded in antitrust law.[330] Even those who defended the Federal Circuit's holdings as consistent with "mainstream antitrust principles," remarked that the Federal Circuit's antitrust analysis was often "poorly articulated," "superficial," "awkward," and not deeply engaged with the type of "rigorous analysis" required by antitrust law.[331] Importantly, studies of agencies charged with formulating competition policy, have found that these agencies tend to downplay intellectual property considerations, or fail to consider the impact

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[324]Dreyfuss, *supra* note ___ at ____.
[325]*Id.*
[326]Guggliuzza, *supra* note ___at ___.
[327]*See, e.g.,* Gugliuzza, *supra* note ___ at ___.
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[330]*See, e.g.,* Peter Boyle, Penelope M. Lister &J. Clayton Everett, Jr. *Antitrust Law at the Federal Circuit: Red Light or Green Light at the IP-Antitrust Intersection?* ANTITRUST L. J. () (arguing that Xerox resolves the conflict between intellectual property and antitrust "resoundingly in favor of strong intellectual property rights.")
[331] Peter Boyle, Penelope M. Lister &J. Clayton Everett, Jr.*Antitrust Law at the Federal Circuit: Red Light or Green Light at the IP-Antitrust Intersection?* 69ANTITRUST L. J. () ("The court's antitrust opinions also often contain imprecise or misguided dicta, including language suggesting that patent owners enjoy such broad immunity from antitrust scrutiny that they will seldom face antitrust liability.").

of breakthrough innovation on competition policy.[332] Taken together, these results are consistent with coordination difficulties predicted from the concentration of expertise in particular communities or institutions.

III. NORMATIVE IMPLICATIONS

A. Federal Circuit Design

The analysis of the Federal Circuit as an expert community developed above has normative implications for the design of the Federal Circuit, and of expert institutions more broadly. In particular, this section shows how two features of decision-making by expert communities—typecasting and inability to self-coordinate—have normatively undesirable consequences in the context of centralized courts. Therefore, efforts at designing expert institutions should pay close attention to ways of minimizing their negative impact. Ultimately, designing expert institutions requires both understanding the likely behavior of these communities in their interactions with other institutional players—which is the focus of this article—and specifying the type and breadth of substantive expertise required to address particular policy problems. This part closes by providing a preliminary sketch and research agenda to address the optimal scope and content of substantive expertise for a specialized patent law court.

1. The Dangers of Typecasting in a Centralized Expert Court

Typecasting can act as a heuristic that formulates what may otherwise be an intractable problem into a solvable question. In essence, this is what the human brain does when it filters a myriad of visual inputs into a few key coordinates that allow us to easily recognize faces. This is also what a chemist may do when approaching and interpreting the human body as a series of chemical reactions. And how a patent attorney may tackle the problem of incentivizing innovation by focusing first and foremost on the role of patents as incentive mechanisms. In other words, typecasting as a framing device is an important tool in efficient problem-solving within an expert community. When expert communities compete for the demand of their services in the professional world, they effectively pit their framing devices against each other as the most effective means to solve particular problems —seeking to gain legitimacy in the eyes of relevant audiences: consumers of their services and law-makers with the power to alter rules in their favor. Thus, the market for services effectively tests expert communities' claims that their approach leads to the best results.

But this type of weeding-out mechanism doesn't function, or is severely impaired, in a centralized expert court, for two principal reasons. The first is the absence of competition between alternative frames through competition

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[332] *See, e.g.,* Michael L. Katz & Howard A. Shelanski, *Merger Analysis and the Treatment of Uncertainty: Should We Expect Better?*, 74 ANTITRUST L. J. 537, 538 (2007) (noting that antitrust analysis may block mergers with pro-innovation outcomes but allow those with anti-innovation possibilities).

among expert communities. Despite potential differences in how individual members of the court are likely to frame a problem, an important goal of any community of experts (and certainly a goal of courts of appeals)[333] is to reach consensus on their approach to a particular problems. The second is the pull of precedent – once consensus is reached and announced in a judicial opinion, framing devices become sticky. Take, for example, the Federal Circuit's treatment of DNA—framing DNA by reference to its chemical structure has permeated the Federal Circuit's analysis of DNA first in the obviousness inquiry and later when considering patentable subject matter. Thus, in the context of a centralized court, typecasting is likely to lead to lower quality decisions, in particular by preventing alternative framings (and thus solutions) of a problem from being fully explored.

One solution proposed by John Duffy and Craig Nard, is to decentralize judicial decision-making in patent law by allowing an additional court of appeals to hear patent cases.[334] This would allow a measure of competition between alternative frames, and thus diminish the problem of typecasting. It is unclear, however, whether the effect of different judicial methodologies or framings on innovation can be efficiently assessed, given the national and often international nature of innovative activity. In other words, it would be an impossible task to attribute a specific, differential real-world effect on innovation to differences in judicial approaches. Decentralization would also come at the cost of losing expertise—as it would become increasingly hard to assemble multiple expert courts in patent law—regardless of how expertise in patent law is defined.

A second solution may be to increase the diversity of relevant technical and professional backgrounds in the court with the goal of representing key innovation sectors and approaches to innovation policy (for example, by appointing more judges with technical expertise in software design, or professional background in antitrust law). But appointing judges with particular technical expertise is likely ill-advised. The structural constraints of a court of appeals regarding the number of judges (currently thirteen) make it impossible to appoint judges with expertise in every single area of technology that comes before the court. And even if such constraints did not exist, or if they could be circumvented (for example, by a system of rotating technical judges with expertise in particular technology areas), the rapidly evolving nature of scientific research makes this proposal impracticable. Scientific fields are not static; in fact, new fields of scientific inquiry often redraw the boundaries between technical specialties, making it hard to match judicial technical expertise with case background.[335] And expertise in a scientific field

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[333] *See, e.g.,* Joshua Fischman, *Estimating Preferences of Circuit Judges: A Model of Consensus Voting*, 54 J. L. Econ. 781 (2011).
[334] Duffy & Nard *supra* note ___.
[335] *See, e.g.,* Pedraza-Fariña, *supra* note ___.

(and in particular in fast-moving fields) is quickly eroded when a judge ceases to be embedded in the relevant scientific community.[336]

The key question then becomes how to minimize the negative aspects of typecasting—or how to increase the number of frames considered by a community of experts—while maintaining the gains in accuracy derived from expertise.[337] At a minimum, the distortive effects of typecasting in particular in the context of a centralized court, suggests that a preferable approach to those outlined above would be to house technological expertise through the use of advisory panels, which are widely used to optimize medical decision-making.[338] Advisory panels can be flexibly designed to achieve the optimal trade-off between diversity of frames and panel size, and experts can rotate so as to minimize the possibility of capture, and maximize the fit between expertise and the particular technical, economic, and social problem under study. Advisory panels could provide input on key issues such as pace of innovation in a particular technology area, the knowledge of a PHOSITA, boundaries of analogous arts, the likelihood of cumulative innovation in a particular field, among others.

This proposal assumes that there are real gains from expert decision-making in patent law—conceptualized as substantial expertise—that can be preserved while minimizing the costs derived from typecasting and inability to coordinate. Both defending that assumption and providing a full answer to how to optimize Federal Circuit expertise (including how to design advisory panels) requires further research into the following questions:

- What kind of substantive expertise is involved in the resolution of patent disputes? There are at least five types of possible expertises:
    - Expertise in the science and technology involved in the discovery
    - Expertise in innovation *dynamics* (both sociological and economic)
    - Expertise in patent law (through continued exposure to relevant cases, or through previous practice experience)
    - Expertise in complex litigation
    - Meta-expertise at the intersection of these four expertises
- How is that expertise best achieved? Through prior immersion in the relevant technical, legal, economic, sociological practice areas? Through interaction with advisory panels?

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[336] Collins & Evans *supra* note ___ at 3.

[337] This question assumes that there are real gains from expertise in patent law—conceptualized as substantial expertise—that can be preserved while minimizing the costs derived from typecasting and inability to coordinate.

[338] Note that advisory panels can be combined with decentralization.

- If advisory panels are used, should these panels advise the PTO, the courts, Congress? If courts, is the advice most relevant at the District Court or Appellate Court level?
- How should coordination problems between different expertises be addressed? Because addressing patent law problems requires relying on expertise from different fields, bringing together the right types of expertise to solve patent disputes will face coordination challenges similar to those in assembling medical review panels, or policy panels.

This issue of coordination is explored in more depth in the next section.

2. Overcoming Coordination Difficulties

In her 1989 analysis of the Federal Circuit's performance in the five years following its creation, Rochelle Dreyfuss pointed out a coordination problem that persists to this day: "If the CAFC is told to encourage invention, but is permitted to see only a small part of the matrix into which patent cases fit [i.e. only patent law] . . . it will undervalue the interest of competitors because it will not have the occasion to consider the role that vigorous competition plays in encouraging invention."[339]Dreyfuss' analysis implied that expanding the Federal Circuit's jurisdiction to include antitrust cases would correct this imbalance.[340] More recently, Paul Gugliuzza took a similar stance in suggesting that replacing some of the Federal Circuit's non-patent docket with commercial disputes may improve the Federal Circuit's understanding of the place of patent law within the broader array of policies designed to incentivize innovation.[341]

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Overcoming coordination difficulties will likely require external incentives or coordination mechanisms. For example, Stuart Benjamin and ArtiRai have recently proposed one such incentive: the creation of an Office of Innovation hosted within the Executive branch, that would coordinate the

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[339]Dreyfuss*supra* note ___ at ___.
[340]*Id.*
[341]Guggliuzza, *supra* note ___ at ____.
[342]*See, e.g.,* Gugliuzza,

activities of agencies and courts that impact innovation, such as the Federal Communications Commission, the Food and Drug Administration, and the Patent and Trademark Office.[343]

B. Beyond the Federal Circuit: Application to other Specialized Courts

The model of expert-decision making developed in this article has implications for understanding the behavior of other specialized courts—and in particular their interactions with generalist superior and subordinte courts, and with agencies. Political scientists have long studied judicial hierarchies under the "principal-agent theory of judging."[344] As its name suggests, this theory describes the relationship between superior and subordinate courts as analogous to that between a principal and an agent. In this model, the principal selects an agent to fulfill a set of specific goals. Agents have a tendency to "shirk rather than fulfill the principal's goal."[345] To induce compliance the principal monitors the agency's behavior. In the context of courts, monitoring takes place through judicial review and judicial holdings that constrain the lower court's freedom to decide cases contrary to the superior court's preferences.[346] In turn, the theory predicts that lower court judges would show some sensitivity to the potential for principal monitoring (and sanctions), adjusting their behavior to avoid reversals by the superior court.[347]

In a recent empirical study, Jonathan Nash and Rafael Pardo tested the principal-agent theory of judges against the voting behavior of bankruptcy judges. They found no evidence of"voting behavior by bankruptcy judges that would suggest sensitivity to the potential for circuit court monitoring and conformity to circuit court preferences."[348] Lower court federal circuit judges did not appear to modify their behavior to comply with the policy preferences of superior court judges. This finding was surprising because bankruptcy judges, who are appointed to the bench by their appellate court superiors, would be expected to experience a stronger monitoring effect, leading to enhanced compliance with superior court preferences.[349]

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[343] Benjamin and Rai, *supra* note ___ at 56-58.
[344] *See, e.g.,* Clifford J. Carrubba& Tom S. Clark*, Rule Creation in a Political Hierarchy,* 106 AM. POL. SCI. REV. 622 (2012); Donald R. Songer, *The Hierarchy of Justice: Testing a Principal-Agent Model of Supreme Court-Circuit Court* Interactions, 38 Am. Pol. Sci. 673 (1994) (describing the Supreme Court as the principal in its interactions with Federal Courts—its agents); Pauline T. Kim, *Beyond Principal–Agent Theories: Law and the Judicial Hierarchy*, 105 NW. U. L. REV. 535, 535 n.1 (2011) (citing additional scholarship describing judicial hierarchy in terms of a principal–agent relationship).
[345] *See, e.g.,* Songer*supra* note ____.
[346] *Id.*
[347] *Id.*
[348] Jonathan Nash & Rafael Pardo, *Rethinking the Principal-Agent Theory of Judging*, 99 IOWA L. REV. 331, ___ (2014).
[349] *Id.* at 338.

The expert community model of judging introduced in this article, however, provides an alternative explanation for the authors' findings in the bankruptcy context. Bankruptcy courts can be conceptualized as expert communities. In this context, their drive for epistemic autonomy and monopoly predicts precisely the type of low sensitivity to circuit court preferences reported by Nash and Pardo—and that principal-agent theories fail to capture.

Case studies and empirical research of other expert courts (such as those in tax and bankruptcy) can help further test and refine the typology of expert decision-making developed in this article. More broadly, future analysis of judicial decision-making should take into account how expert decision-making impacts the relationships between subordinate and superior courts.

IV. CONCLUSION

The Federal Circuit sits at the epicenter of a vigorous debate over the role of specialized courts in a broader system of generalist judges. Critics of the Federal Circuit view the court as a failed experiment in judicial specialization. They point to its over-reliance on inflexible rules, its refusal to accord deference to both district courts and the PTO, and its failure to maintain doctrinal uniformity as evidence. In contrast, supporters of judicial specialization in patent law warn that decentralization would lead to increased forum-shopping and a high level of uncertainty regarding the applicable legal regime—ultimately dampening innovation.

This article argued that any principled discussion of Federal Circuit design requires an understanding of decision-making by expert communities. In particular, it requires addressing three fundamental questions: (1) How does subject-matter specialization or expertise impact the *content* of judicial decisions? (2) How does subject-matter specialization or expertise impact the *form* of judicial decisions? (3) How does subject-matter specialization or expertise impact the *relationship* between decision-making bodies? Drawing on a rich literature on the sociology of expertise, this article takes a first step in answering these key questions by developing a typology of five features ofdecision-making by expert communities. The article demonstrates how these five features explain puzzling aspectsof Federal Circuit jurisprudence, such as lack of deference to both the District Courts and the PTO, defiance to Supreme Court decisions, and a preference for rules over standards.

Importantly, the typology has two broader implications. First, it identifies two specific features of expert communities—typecasting and inability to self-coordinate—that are normatively undesirable in the context of a centralized expert court, and provides suggestions for minimizing their impact. Second, it provides a novel theoretical lens with which to analyze the behavior of other expert courts.