PATENT LAW 101: I KNOW IT WHEN I SEE IT
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ABSTRACT

Patent subject-matter eligibility under § 101 has been criticized from many angles, and yet still is without meaningful reform. This project adds to the corpus by demonstrating a troubling consequence of § 101 doctrine in the decade of case law since *Alice* and *Mayo*: panel-dependent outcomes at the Federal Circuit. That is to say, § 101 outcomes on appeal are demonstrably influenced by which particular judges are assigned to the panel. Panel dependence—at the unitary, specialized, and expert patent appeals court—would seem to suggest that § 101 reform is urgently needed. The Supreme Court and Congress have effectively given the Federal Circuit the last word on § 101. A lack of consistency from that body should be especially concerning, and indicates that intervention from one of the former is warranted.

This draft reflects the results after completion of roughly 2/3rds of case coding—results which do seem to confirm panel dependence. I hope that the final results will be a useful contribution to the ongoing dialogue on § 101 reform. I appreciate your time and consideration, and I welcome your comments.

I.   BACKGROUND

Section 101 governs what kind of subject matter is patentable—on its face, seemingly anything: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent . . . ."[1] As the Supreme Court has recognized, "Congress intended statutory subject matter to 'include anything under the sun that is made by man.'"[2] Over time, a series of judicially created carveouts and tests have come to cabin this textual breadth, and now offer the central doctrine of subject-matter eligibility. That is: "[l]aws of nature, natural phenomena, and abstract ideas" cannot receive patent protection.[3] In some cases, determining whether one of these categories applies is quite easy. Einstein, for example, "could not patent his celebrated law that E=mc2 [,] nor could Newton have patented the law of gravity," because such formulae are plainly laws of nature.[4] But things quickly become complex—dizzyingly so. Lab-isolated genes relating to breast cancer are natural phenomena ineligible for patenting,[5] whereas exon-only "complementary DNA" is eligible.[6] A mathematically defined process for hedging against the risk of price fluctuations in commodities markets is an abstract idea

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[1] 35 U.S.C. § 101.

[2] Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980) (quoting S. REP. NO. 82-1979 (1952); H.R. REP. NO. 82-1923 (1952), *reprinted in* 1952 U.S.C.C.A.N. 2394, 2399).

[3] Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 573 U.S. 208, 216 (2014) (quoting Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 133 S. Ct. 2107, 2116 (2013)); *see also* Bilski v. Kappos, 561 U.S. 593, 601 (2010) (quoting Chakrabarty, 447 U.S. at 309) ("The Court's precedents provide three specific exceptions to § 101's broad patent-eligibility principles: 'laws of nature, physical phenomena, and abstract ideas.'").

[4] Chakrabarty, 447 U.S. at 309 (citing Funk Bros. Seed Co. v. Kala Inoculant Co., 333 U. S. 127, 130 (1948)).

[5] *Myriad*, 569 U.S. at 580.

[6] *Id.* at 580, 595–96 ("[T]he lab technician unquestionably creates something new when [complementary DNA] is made.").

ineligible for patenting,[7] whereas a logic model for organizing and improving searchability of a database is eligible.[8]

  Alice Corp. v. CLS Bank[9] offers the Court's most recent discussion of § 101—but little in the way of clarity. Specifically, the Court set forth a challenging two-step framework for adjudicating subject-matter eligibility: (1) "determine whether the [patent] claims at issue are directed to one of those patent-ineligible concepts,"[10] such as an abstract idea; and (2) if so, then examine "the elements of each claim both individually and 'as an ordered combination' to determine whether [there are] additional elements [that nevertheless] 'transform the nature of the claim' into a patent-eligible application."[11] This test has proved less than popular. In the immediate aftermath of *Alice*, academics stated that "there is now less clarity on the basic question of patent eligibility than at almost any other time in American patent law."[12] Even now, after the two-step framework has been the governing test for a decade, the patent community still appears to struggle greatly with determining precisely what is eligible subject matter. Administrative Patent Judge Hung Bui described the task in Sisyphean terms: each new legal construct "fail[s] and fail[s] again, year after year."[13] The former USPTO Director, David J. Kappos, took an even more aggressive tone, calling for the flat elimination of § 101, and stating that the test in Alice created "[p]roblematic confusion and unpredictability."[14] Even judges on the specialized Court of Appeals for the Federal Circuit have pleaded for help: "If I, as a judge with 22 years of experience deciding patent cases on the Federal Circuit's bench, cannot predict outcomes based on case law, how can we expect patent examiners, trial judges, inventors and investors to do so?"[15]

  Recently, reform efforts have gained some traction—but they have not yielded actual change in the law. In 2017, the USPTO sought the views and recommendations of the public regarding patent-eligible subject matter.[16] Overall, commentators expressed that the Supreme Court had "failed to [provide] objective, predictable criteria . . . to determine whether a claim is drawn to eligible or

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[7] *Bilski*, 561 U.S. at 612.

[8] Enfish, LLC v. Microsoft Corp., 822 F.3d 1327, 1330 (Fed. Cir. 2016).

[9] 537 U.S. 208 (2014).

[10] *Id.* at 217 (citing Mayo Collaborative Services v. Prometheus, 566 U.S. 66, 76–78 (2012)).

[11] *Id.* (quoting *Mayo*, 566 U.S. at 79, 78).

[12] Jeffrey A. Lefstin, *The Three Faces of Prometheus: A Post-Alice Jurisprudence of Abstractions*, 16 N.C. J.L. & TECH. 647, 649 (2015); *see also* J. Jonas Anderson, *Applying Patent-Eligible Subject Matter Restrictions*, 17 VAND. J. ENT. & TECH. L. 267, 269 (2015) ("The Supreme Court's interest in, and difficulty with, promulgating a consistent standard for determining which inventions are patent eligible has not gone unnoticed in the academy.").

[13] Hung H. Bui, *A Common Sense Approach to Implement the Supreme Court's* Alice *Two-Step Framework to Provide "Certainty" and "Predictability"*, 100 J. PAT. & TRADEMARK OFF. SOC'Y 165, 165 (2018).

[14] David Kappos, *The State of the Patent System: A Look at the Numbers*, LAW360 (Nov. 27, 2017), https://www.law360.com/articles/987044/the-state-of-thepatent-system-a-look-at-the-numbers.

[15] The State of Patent Eligibility in America, Part I: Hearing Before the Subcommittee on Intellectual Property of the S. Comm. on the Judiciary, 116th Cong. 2 (June 4, 2019) (statement of Judge Paul Michel); *see also* Berkheimer v. HP Inc., 890 F.3d 1369, 1374 (Fed. Cir. 2018) (Lourie, J., concurring) ("I believe the law needs clarification by higher authority, perhaps by Congress, to work its way out of what so many in the innovation field consider are § 101 problems."); Interval Licensing LLC v. AOL, Inc., 896 F.3d 1335, 1355 (Fed. Cir. 2018) (S. Jay Plager, J.) (describing § 101 doctrine as "useless," "unworkable," and "incoherent").

[16] U.S. PATENT & TRADEMARK OFFICE, USPTO PATENT ELIGIBLE SUBJECT MATTER: REPORT ON VIEWS AND RECOMMENDATIONS FROM THE PUBLIC (2017),

ineligible subject matter."[17] In particular, the *Alice* two-step was described variously as a "nightmare,"[18] "unworkable,"[19] "fail[ing] to define crucial terms,"[20] and creating "[in]sufficient certainty to serve as a legal standard for anything, let alone the important determination of whether an invention is patent eligible."[21] Along similar lines, the Senate Judiciary Committee's Subcommittee on Intellectual Property held hearings and solicited testimony from dozens of witnesses regarding § 101 in 2019, including "representatives from industry, academia, bar associations, and trade groups" alike—many of whom made similar arguments about the need for greater clarity and certainty.[22] With the assistance of the Federal Judicial Center, the author deployed a judicial survey that same year, seeking the views of federal district court judges on the state of § 101 doctrine.[23] This survey confirmed that judges themselves "consider subject-matter eligibility to be the least settled area of [patent] law," and one of the principal drivers of patent case difficulty.[24] In 2021, the USPTO again sought the views and recommendations of the public, with the responses suggesting little to no improvement had occurred organically since their previous solicitation.[25]

Despite these and other calls to reform, however, concrete action has been limited. The USPTO revised its Manual of Patent Examining Procedure to better track *Alice* and subsequent case law,[26] including exemplary § 101 analyses, but did not (and could not[27]) change the substantive law

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[17] *Id.* at 29–30.

[18] *Id.* at 30 (quoting Robert A. Armitage, Response to the October 17, 2016 Federal Register Notice on Patent Subject Matter Eligibility: Exploring the Legal Contours of Subject Matter Eligibility (Dec. 5, 2016), https://www.uspto.gov/sites/default/files/documents/Armitage%20Response%20to%20USP TO%20Federal%20Register%20Notice%20on%20Patent%20Eligibility%20%20%20.pdf.

[19] *Id.* (quoting Bruce D. Sunstein, Written Comments on Legislation Concerning Patent Eligibility (Jan. 12, 2017), https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20Bruce%20Suns tein.pdf.

[20] *Id.*

[21] *Id.* at 30 (quoting R&D Companies, Response to Request for Comments Related to Exploring the Legal Contours of Patent Subject Matter Eligibility (Jan. 18, 2017), https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20InterDigital%2 0Inc.pdf.

[22] Kevin Hickey, CONG. RESEARCH SERV., R45918, PATENT-ELIGIBLE SUBJECT MATTER REFORM IN THE 116TH CONGRESS 34 (2019), https://fas.org/sgp/crs/misc/R45918.pdf; *see* Bruce M. Wexler et al., *Senate Hearing on "The State of Patent Eligibility in America": Analysis of Viewpoints on Looming Section 101 Change*, PAUL HASTINGS, (June 25, 2019), https://www.paulhastings.com/publicationsitems/details/?id=c58c536d-2334-6428-811c-ff00004cbded ("In particular, many witnesses stressed how the lack of certainty in current patent eligibility law has impacted investment in research and innovation.").

[23] *See* Matthew Sipe, *Patent Law 101: The View from the Bench*, 88 GEO. WASH. L. REV. ARGUENDO 21 (2020).

[24] *Id.* at 28-30.

[25] *See* Mary Critharis, *Report to Congress on "Patent Eligible Subject Matter: Public Views on the Current Jurisprudence in the United States* at 7, U.S. PATENT & TRADEMARK OFFICE (June 29, 2022), https://www.uspto.gov/sites/default/files/documents/Patent-Eligibility-Jurisprudence-Report.pdf ("Critics expressed concern that the jurisprudence has unreasonably and improperly expanded the scope and application of the judicially created exceptions to eligibility, resulting in significant inconsistencies, uncertainty, and unpredictability in the issuance and enforcement of patents.").

[26] *See Change Summary for the Ninth Edition Manual of Patent Examining Procedure*, U.S. PATENT & TRADEMARK OFFICE (June 2020), https://www.uspto.gov/web/offices/pac/mpep/mpep-0005-change-summary.html ("Chapter 2100 was amended to include the following notices: *October 2019 Patent Eligibility Guidance Update*, 84 [Fed. Reg.] 55941 (October 18, 2019); . . . and *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 [Fed. Reg.] 50 (January 7, 2019).").

[27] *See* Merck & Co. v. Kessler, 80 F.3d 1543, 1550 (Fed. Cir. 1996) ("Such deference as we owe to the PTO's interpretive "Final Determination" . . . thus arises, not from the rule of *Chevron*, but solely from, *inter alia*, the thoroughness of its consideration and the validity of its reasoning, i.e., its basic power to persuade . . . .") (citing Skidmore v. Swift & Co., 323 U.S. 134, 140 (1944); *see generally* Cooper Techs. Co. v. Dudas, 536 F.3d 1330, 1335 (Fed. Cir. 2008) ("To comply with [35 U.S.C.] section 2(b)(2)(A), a Patent Office rule must be 'procedural'-i.e., it must 'govern the conduct of proceedings in the Office.'"); Merck & Co. v. Kessler, 80 F.3d 1543, 1550 (Fed. Cir. 1996) ("[T]he broadest of the

that must be applied. Meanwhile, the Supreme Court has consistently declined to hear cases regarding § 101—even those with a highly divided Federal Circuit below[28] and the Solicitor General supporting a grant of certiorari.[29] High-profile and bipartisan attempts at legislation have likewise stalled, and there are no signs of further congressional action on the immediate horizon.[30] Thus, the *Alice* two-step framework very much remains the law, with the Federal Circuit as the de facto court of last resort.

On the one hand, the unitary structure of patent appeals might—indeed, was intended by design to[31]—promote uniformity and clarity where other sources have failed to do so. On the other hand, the Federal Circuit has been subject to repeated critiques of panel-dependent decision making.[32] The issue of patent claim construction in particular has generated a considerable body of scholarship on panel dependence.[33] Where it exists, panel dependency naturally implicates a host of issues like notice and fairness; this should be particularly concerning in the patent context, insofar as it reduces incentives to innovate by unpredictably upsetting investment-backed efforts. Moreover, because the Federal Circuit conceals the identity of panel members until oral argument, panel dependency at that level makes settlement especially challenging—and may even undermine the perceived legitimacy of decision making. Without other circuits to generate visible splits, panel-dependent outcomes could also be the best possible indicator of an urgent need for Supreme Court intervention. Previous

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PTO's rulemaking powers . . . does NOT grant the Commissioner the authority to issue substantive rules . . . [t]hus, the rule of controlling deference set forth in *Chevron* does not apply").

[28] *See, e.g.*, American Axle & Mfg., Inc. v. Neapco Holdings LLC, 966 F.3d 1347 (Fed. Cir. 2020) (splitting six-to-six on whether to take the case en banc, with five separately authored opinions).

[29] Brief for the United States as Amicus Curiae, American Axle & Mfg., Inc. v. Neapco Holdings LLC, No. 20-891 (May 24, 2022).

[30] *See* Press Release, Office of Sen. Thom Tillis, *Sens. Tillis and Coons and Reps. Collins, Johnson, and Stivers Release Draft Bill Text to Reform Section 101 of the Patent Act* (May 22, 2019), https://www.tillis.senate.gov/2019/5/sens-tillis-and-coons-and-reps-collinsjohnson-and-stivers-release-draft-bill-text-to-reform-section-101-of-the-patent-act; *see* Sen. Tillis et al., *Draft Bill for Section 101 Reform*, https://www.tillis.senate.gov/services/files/E8ED2188-DC15-4876-8F51-A03CF4A63E26; *see generally* Dani Kass, *Justices' Patent Eligibility Denial Won't End Fight for Clarity*, LAW360 (June 30, 2022), https://www-law360-com.proxy-bl.researchport.umd.edu/articles/1507770/justices-patent-eligibility-denial-won-t-end-fight-for-clarity ("Multiple senators have repeatedly addressed their frustrations with the state of patent eligibility law, but [the] two large patent reform bills released in the last year didn't address Section 101 of the Patent Act.").

[31] *See* H.R. REP. NO. 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. . . . [T]he central purpose is to reduce the widespread lack of uniformity and uncertainty of legal doctrine that exist in the administration of patent law."); *see generally* Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25 (creating the Court of Appeals for the Federal Circuit).

[32] *See generally* Paul R. Michel, *The Court of Appeals for the Federal Circuit Must Evolve to Meet the Challenges Ahead*, 48 AM. U. L. REV. 1177, 1191 (1999) ("The problem most frequently mentioned by practitioners is known as 'panel-dependency.' Panel dependency is the belief that the result in a case is a function of the membership of the three-judge panel."); Craig Allen Nard & John F. Duffy, *Rethinking Patent Law's Uniformity Principle*, 101 NW. U. L. REV. 1619, 1669 (2007) ("[M]any lawyers and commentators believe that the Federal Circuit is highly 'panel dependent,' with the application of the law differing dramatically depending on the judges drawn for a particular panel. While that charge remains controversial, many lawyers believe it to be true.").

[33] *See, e.g.*, Jeremy W. Bock, *Behavioral Claim Construction*, 102 MINN. L. REV. 1273, 1274 (examining the "behavioral elements—such as cognitive biases, priors, and situational factors—that may influence how [different adjudicators] interpret[] a claim"); R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1112 (2004) ("Our findings . . . indicate that claim construction at the Federal Circuit is panel dependent."); Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?*, 12 FED. CIR. B.J. 1, 21 (2003) (suggesting a "high degree of conformance among voting patterns of the Federal Circuit judges in these claim construction appeals"); Christian A. Chu, *Empirical Analysis of the Federal Circuit's Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075, 1100 (2001) (rejecting the hypothesis of panel dependency in claim construction).

scholarship on § 101 has included empirical analyses of, for example, the uneven use of Rule 36 summary affirmances,[34] but the specific issue of panel-dependent outcomes has not been tested.

Now is an ideal time to take stock of § 101 at the Federal Circuit level. As a baseline, there are ten full years of cases applying the *Alice* framework, and an ongoing dialogue around § 101 reform in general. But on top of that, two § 101 questions that provoke disagreement amongst the Federal Circuit judges have been made increasingly explicit in written opinions: (1) when a claim is "directed to" an ineligible concept under step one, given that almost all patent claims indirectly cite or rely on abstract ideas, laws of nature, and natural phenomena to function;[35] and (2) when "additional elements" save an otherwise ineligible claim under step two, given that subject-matter eligibility is a question of law and factual questions of novelty and non-obviousness exist separately.[36] The widespread perception that § 101 is an outlier in terms of clarity within patent law—coupled with such clear disagreement amongst the judges on fundamental questions of scope and depth—suggests that an empirical examination of panel dependence is well warranted.

II.   METHODOLOGY

This dataset covers every Federal Circuit case in which § 101 eligibility was contested on appeal, from the court's founding up to the time of writing. To identify this subset of Federal Circuit cases, Professor Jason Rantanen's *Compendium of Federal Circuit Decisions*[37] was used as a starting point; the majority of cases in the *Compendium* have already been coded for whether or not § 101 eligibility was at issue. Datasets from previous empirical work by Professors Gugliuzza and Lemley,[38] the author,[39] and law firms[40] are being used as a supplemental check for any cases missing from or erroneously coded as lacking § 101 issues in the *Compendium*. The cases in the *Compendium* that were not already coded for § 101 are being checked individually by the author. At this time, there is an estimated starting population of roughly 450 cases.

For purposes of this analysis, however, more granular information is needed on these cases than preexisting sources can offer. Docket information from PACER, coding performed by the *Compendium*, and commercial analytics like WestLaw's *Lex Machina* platform[41] are excellent for certain applications, but they are generally unable to capture individual judges' doctrinal views on a case-by-case level. Such sources indicate information like a case's final disposition (e.g., "affirmed in part and reversed in part"), but no systematic way to tell which outcomes apply to which findings made below—or whether certain findings below were addressed on their merits at all. Cases where § 101 was nominally at issue on appeal but resolved on the basis of collateral estoppel[42] or waiver,[43] for

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[34] *See* Paul R. Gugliuzza & Mark A. Lemley, *Can A Court Change the Law by Saying Nothing?*, 71 VAND. L. REV. 765 (2018).

[35] *See supra* notes 28-31.

[36] *Compare, e.g.*, Intellectual Ventures I LLC v. Capital One Financial Corporation, 850 F.3d 1332, 1338 (Fed. Cir. 2017) ("Patent eligibility under § 101 is an issue of law that we review without deference.") *with, e.g.*, Berkheimer v. HP Inc., 881 F.3d 1360, 1365 (Fed. Cir. 2018) ("The patent eligibility inquiry may contain underlying issues of fact.").

[37] *See generally* Jason Rantanen, *The Landscape of Modern Patent Appeals*, 67 AM. U. L. REV. 985 (2018).

[38] *See supra* note 34 (collecting roughly 100 cases involving § 101 between the *Alice* decision and 2018).

[39] *See* Matthew Sipe, *Experts, Generalists, Laypeople—and the Federal Circuit*, 32 HARV. J.L. & TECH. 575 (2019).

[40] *See* GIBSON, DUNN & CRUTCHER LLP, *Overview of Section 101 Patent Cases Decided after* Alice v. CLS Bank (Mar. 1, 2019), https://www.gibsondunn.com/wp-content/uploads/2019/03/Overview-of-Section-101-Patent-Cases-Decided-After-Alice-v-CLS-as-of-03-01-19.pdf.

[41] LEX MACHINA, http://law.lexmachina.com.

[42] *See, e.g.*, *Intell. Ventures I LLC v. Cap. One Fin. Corp.*, 850 F.3d 1332, 1335 (Fed. Cir. 2017).

[43] *See, e.g.*, *Move, Inc. v. Real Est. All. Ltd.*, 721 F. App'x 950, 958 (Fed. Cir. 2018).

example, don't provide useful information on the substantive application of § 101, and therefore need to be culled from the set. Multiple opinions in a single case also presents an issue; an opinion styled as a dissent (or dissent-in-part) may take no view at all on the merits of the § 101 issue[44] (or concur with the majority on it[45]). These kinds of problems only multiply further in the many cases where multiple claims and patents are separately at issue on appeal.

Accordingly, hand-coding is needed. The author read and annotated the materials for each case in the dataset—direct review of the appellate and district court docket, briefs, orders, and opinions as needed—to most accurately determine the substantive § 101 issues raised and their outcomes. Those issues and outcomes were, in turn, converted into data points, and compiled into a database on which statistical operations could be performed. As other scholars have noted, this type of hand-coding is "notoriously difficult and time consuming, requiring deep knowledge of patent law,"[46] but it also solves the myriad problems noted above. The result: a uniquely accurate picture of Federal Circuit decision-making on § 101.

As in previous empirical work by the author,[47] claim-case combinations are used as the unit of analysis. In other words, for each case, subject-matter eligibility issues that were actually reviewed on appeal are indexed by the set of affected patent claims. This approach attempts to best simulate the reality of decision-making; if the Federal Circuit and litigants treated a given set of claims as all rising or falling together under § 101 on appeal, then so will the dataset. This kind of claim indexing is entirely straightforward in most cases, because of how strongly and explicitly the Federal Circuit itself has embraced grouping claims together for § 101 purposes.[48] In turn, litigants will often stipulate outright that a certain claim or claims are representative of a larger set,[49] or—by virtue of their

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[44] *See, e.g.*, Return Mail, Inc. v. United States Postal Service, 868 F.3d 1350, 1371 (Fed. Cir. 2017) (Newman, J., dissenting) (finding a lack of jurisdiction).

[45] *See, e.g.*, Core Wireless Licensing S.A.R.L. v. LG Elec., Inc., 880 F.3d 1356, 1369 (Fed. Cir. 2018) (Wallach, J., concurring-in-part and dissenting-in-part) ("I agree with the majority that the U.S. District Court for the Eastern District of Texas . . . did not err either in determining that claims 11 and 13 of U.S. Patent No. 8,434,020 ("the '020 patent") and claims 8–9 of U.S. Patent No. 8,713,476 ("the '476 patent") . . . are patent eligible.").

[46] Mark Lemley et al., *Our Divided Patent System*, 82 U. CHI. L. REV. 1073, 1081 (2015).

[47] Sipe, *supra* note 39, at 592.

[48] *See, e.g.*, Voter Verified, Inc. v. Election Sys. & Software LLC, 887 F.3d 1376, 1385 (Fed. Cir. 2018) ("While these claims encompass both methods and systems, we find there to be no distinction between them for § 101 purposes, as they simply recite the same concept."); Content Extraction and Transmission LLC v. Wells Fargo Bank, Nat'l Ass'n, 776 F.3d 1343, 1348 (Fed. Cir. 2014) ("CET next argues that the failure of PNC or the district court to individually address every one of its claims is inconsistent with the statutory presumption of validity that requires proving the invalidity of each claim by clear and convincing evidence. . . . The district court, however, correctly determined that addressing each claim of the asserted patents was unnecessary. After conducting its own analysis, the district court determined that PNC is correct that claim 1 of the '855 patent and claim 1 of the '416 patent are representative, because all the claims are 'substantially similar and linked to the same abstract idea.'"); Bancorp Servs., L.L.C. v. Sun Life Assur. Co. of Canada (U.S.), 687 F.3d 1266, 1277 (Fed. Cir. 2012) ("The only difference between the claims is the form in which they were drafted. The district court correctly treated the system and method claims at issue in this case as equivalent for purposes of patent eligibility under § 101.").

[49] *See, e.g.*, Genetic Techs. Ltd. v. Merial L.L.C., 818 F.3d 1369, 1371 (Fed. Cir. 2016) ("For purposes of this appeal, the parties have stipulated that claim 1 is representative of all of the invalidated claims.").

briefing—concede as much.[50] Taking the litigants' arguments as a starting point, the district courts[51] and PTO[52] are quick to engage in this kind of grouping as well.

In short, by the time a case has reached the Federal Circuit and led to an opinion, claim indexing is typically not a difficult task:

> We first consider the claims of the '539 patent. . . . Claim 22 is representative of the '539 patent claims at issue . . . . [W]e agree with the district court that, like the claims at issue in *Prism*, claim 22 is directed to an abstract idea. . . . Turning to *Alice* step two, the district court rejected USR's argument that the claim's recitations of (1) time-varying codes and (2) sending data to a third-party as opposed to the merchant each rise to the level of an inventive concept. . . . We agree.
> . . .
> We next consider the claims of the '813 patent. . . . Claim 1 of the '813 patent is representative . . . . We agree with the district court that the claims are directed to an abstract idea, not a technological solution to a technological problem, as USR asserts. . . . We agree with the district court that the claims fail to recite an inventive concept that would transform the abstract idea into patentable subject matter.
> . . .
> We next turn to the claims of the '826 patent. . . . Claim 10 is representative of the '826 patent claims at issue . . . We agree with the district court that the claims are directed to an abstract idea. . . . We agree with the district court's conclusion that the claims do not recite an inventive concept.
> . . .
> Finally, we consider the claims of the '137 patent. . . . Claim 12 is a system claim and is representative of the '137 patent claims at issue . . . . Although claim 12 of the '137 patent is more detailed than claim 10 of the '826 patent, we nonetheless agree with the district court that it too is directed to an abstract idea. . . . Turning to step two, the district court determined that claim 12 "lacks the inventive concept necessary to convert the claimed system into patentable subject matter." On appeal, USR asserts that the use of a time-varying value, a biometric authentication indicator, and authentication information that can be sent from the first device to the second device form an inventive concept. We disagree.[53]

With the Federal Circuit separately analyzing a single representative claim for each patent, this particular case provided four data points: one for the '539 patent, one for the '813 patent, one for the

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[50] *See, e.g.*, W. Express Bancshares, LLC v. Green Dot Corp., 816 F. App'x 485, 486 (Fed. Cir. 2020) ("Western Express does not separately argue the other claims in the '932 patent, nor contest the district court's determinations that independent Claims 17 and 29 are 'substantially similar to Claim 1,' and the dependent claims 'do not add significant limitations to Claim 1.'").

[51] *See, e.g.*, SmileDirectClub, LLC v. Candid Care Co., 505 F. Supp. 3d 340, 346-47 (D. Del. 2020), *aff'd*, 856 F. App'x 893 (Fed. Cir. 2021) ("After reviewing all thirty claims of the '522 patent, I conclude that the claims are all substantially similar and that no individual claim contains limitations that raise distinct issues for determining that claim's § 101 eligibility. . . . The independent claims all describe methods or systems that cover the same business strategy.").

[52] *See, e.g.*, Bozeman Fin. LLC v. Fed. Rsrv. Bank of Atlanta, 955 F.3d 971, 977-78 (Fed. Cir. 2020) (The [PTAB] nevertheless viewed as applicable the reasoning it provided in the CBM related to the '840 patent and held ineligible the claims of the '640 patent. . . .").

[53] Universal Secure Registry LLC v. Apple Inc., 10 F.4th 1342, 1348-1358 (Fed. Cir. 2021).

'826 patent, and one for the '137 patent. Other cases distinguished between claims within a single patent, but were still very straightforward in their analysis:

> Claims 1–23 and 36–68 are method claims; claims 24–35 are "paradigm" claims. Claim 1 . . . is representative of Applicants' method claims . . . . Claim 24 . . . is representative of Applicants' paradigm claims.
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> . . .
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> As to Applicants' method claims, which at least nominally fall into the category of process claims, this court's recent decision in *Bilski* is dispositive. . . . We hold, therefore, that Applicants' method claims are not patentable.
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> . . .
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> Turning now to Applicants' paradigm claims . . . [they] must satisfy at least one category [of statutory subject matter]. . . . We hold that they do not.[54]

Hence, this case provided two data points: one for claims {1-23, 36-68}; and one for claims {24-35}.

For cases with written opinions, this method of coding is entirely straightforward and requires almost no subjective interpretation of the case materials. More challenging, however, is the Federal Circuit's use of summary affirmances under Rule 36.[55] Because Rule 36 affirmances do not explain the specific basis for affirming, it is not clear on the face of the opinion how they should be counted for purposes of the dataset. Nevertheless, for most Rule 36 cases, a review of the decision below (to locate and index any § 101 holdings) and the appellate briefing (to confirm that each holding was actually disputed on appeal) was still sufficient to determine what the Federal Circuit was necessarily affirming. For example, *Essociate, Inc. v. Clickbooth.com, LLC* was a Rule 36 affirmance.[56] But the district court's decision below very clearly selected one representative claim for the patent at issue and proceeded to find a lack of § 101 eligibility on that basis.[57] The parties' appellate briefing confirms that the § 101 holding was actually appealed on its merits—and that the choice of claim 1 as representative was not disputed.[58]

Even when a Rule 36 case involves multiple grounds for invalidity, it is typically still easy to determine whether any § 101 holdings below actually provided the basis for affirming the outcome on appeal. Often, this is because the § 101 holding is the only one to encompass all asserted claims. In *Kroger IP Holdings, LLC v. Safeway, Inc.*, for example, the district court found claims {1, 19, 20, 21, 23, and 24} of the '830 patent invalid for anticipation and obviousness,[59] and claims {1, 19, 20-25} invalid under § 101.[60] Because two of the asserted claims can only be found in the § 101 set (22 and 25), that holding must have been reviewed and affirmed on appeal for the judgment below to stand. Hence,

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[54] In re Ferguson, 558 F.3d 1359, 1362-65 (Fed. Cir. 2009).

[55] FED. CIR. R. 36 (stating that "[t]he court may enter a judgment of affirmance without opinion, citing this rule, when . . . an opinion would have no precedential value" and the decision below presents no error requiring reversal, vacatur, or remand).

[56] 641 F. App'x 1006 (Fed. Cir. 2015).

[57] Essociate, Inc. v. Clickbooth.com, LLC, 2015 WL 1428919 at *4 ("Essociate alleges that Clickbooth and CrakMedia are infringing multiple claims of the '660 Patent, but the parties agree that analysis of Claim 1 is representative of the analysis of the other claims. . . . Claim 1 of the '660 Patent is a method claim and reads as follows . . . .").

[58] *See, e.g.*, Brief of Defendants-Appellees Clickbooth.com, LLC, Essociate, Inc. v. Clickbooth.com, LLC, 2015 WL 5120859 (Fed. Cir. Aug. 26, 2015) ("All parties agree that claim 1 is representative for purposes of this appeal.").

[59] 107 F. Supp. 3d 656, 677 (E.D. Tex. 2015).

[60] 107 F. Supp. 3d 677, 705 (E.D. Tex. 2015).

although the case was a Rule 36 affirmance, it can confidently be included in the dataset as a § 101 case.[61] This sort of set logic—rather than mixing and matching—tracks the Federal Circuit's approach in written opinions as well:

> Customedia Technologies, LLC appeals the Patent Trial and Appeal Board's final written decisions holding claims 1–6, 8, 17, and 23 of U.S. Patent No. 8,719,090 and claims 1–4, 6–7, 16–19, 23–24, 26–28, 32–36, and 41 of U.S. Patent No. 9,053,494 ineligible under 35 U.S.C. § 101 and finding claims 1 and 5 of the '090 patent unpatentable under 35 U.S.C. § 102. Because the claims are ineligible under § 101, we affirm the Board's determinations. We do not reach the Board's § 102 findings.[62]

Very rarely, the set structure of holdings below would have theoretically allowed the Federal Circuit to affirm a judgment of invalidity below while avoiding any § 101 issues reached below.[63] For example, in *In re Villena*,[64] the PTAB made the following determinations regarding patent application 10/536,692: (1) claims {133, 141, 142, and 145} were anticipated; (2) claims {134-140, 143, 144, 146-151, and 155} were obvious; and (3) claims {133-151, and 155} were invalid under § 101. Set (3) is simply the union of sets (1) and (2), so it's possible that the Federal Circuit's use of Rule 36 in this case reflects an affirmance of the anticipation and obviousness holdings alone, without having ever considered § 101. But this would be at odds with the Federal Circuit's apparent preference for relying on § 101 grounds. Coding of the written opinions revealed case after case where there were alternative grounds available for affirming, but the Federal Circuit still chose § 101 alone.[65] Hence, to best reflect the realities of Federal Circuit decision making, even unusual cases like *In re Villena* were still included in the dataset.

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[61] Kroy IP Holdings, LLC v. Safeway, Inc., 639 F. App'x 637 (Fed. Cir. 2016).

[62] Customedia Techs., LLC v. Dish Network Corp., 951 F.3d 1359, 1360-61 (Fed. Cir. 2020).

[63] This kind of ambiguity can logically only apply in the invalidity context. If a district court, for example, found a given set of claims eligible under § 101 and non-obvious as well, then a Rule 36 judgment would necessarily be affirming both findings. Otherwise, the end result—patent validity—would not stand.

[64] 669 F. App'x 573 (Fed. Cir. 2016).

[65] *See, e.g.*, In re Greenstein, 782 F. App'x 1035, 1038 (Fed. Cir. 2019) ("Thus, we conclude the Board did not err in holding that the claims of the '768 application are ineligible under § 101. Because we conclude that the Board did not err in holding all of the claims ineligible, we need not review its anticipation and obviousness rulings."); In re Gitlin, 775 F. App'x 689, 692 (Fed. Cir. 2019) ("Because we affirm the Board's rejection of the appealed claims under § 101, we need not review the Board's alternative § 103 rejection or its § 112, second paragraph rejection of a subset of the claims."); In re Greenstein, 774 F. App'x 661, 665 (Fed. Cir. 2019) ("Thus, we conclude that the Board did not err in holding that Greenstein's claims are ineligible for patenting under § 101, and, accordingly, we need not review its obviousness ruling."); In re Wang, 737 F. App'x 534, 535 (Fed. Cir. 2018) ("Because, as explained below, we agree with the Board that the application claims on appeal are directed to non-statutory subject matter, we affirm the Board's decision. We do not reach the remaining issues decided by the Board.").

After coding, each claim-case data point includes the following information:

- Case number, name, and date;

- Precedential status of the opinion;

- Patent numbers and claims affected;

- Technology classes of the patents affected;

- Specific tribunal and judges below (e.g., Eastern District of Texas, PTAB, etc.);

- Subject-matter eligibility findings by the tribunal below (including the standard or test applied);

- Posture of the findings below (e.g., summary judgment, inter partes review, etc.);

- Federal Circuit panel members, opinion authors, and their respective positions on the subject-matter eligibility findings (including the standard or test applied); and

- Bottom-line disposition on appeal (e.g., affirmed, vacated, etc.).

A brief explanation is warranted regarding patent technology classes in particular. For each patent, the author began with the USPTO's own United States Patent Classification (USPC) designation, if available. For example, Patent No. 7,970,379 (entitled "Payroll processing, certification, reporting and project management system and method")[66] is labeled by the USPTO as within USPC class number 705: "Data Processing: Financial, Business Practice, Management, or Cost/Price Determination."[67] In turn, those class designations were condensed and simplified into six supercategories for more sensible quantitative use: (1) chemical; (2) computers and communications; (3) drugs and medical; (4) electrical and electronics; (5) mechanical; and (6) not otherwise classified.[68] The aforementioned 705 class, for example, corresponds to the "computers and communications" supercategory, so the '379 patent was so designated. The USPC designation system has been gradually

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[66] U.S. Patent No. 7,970,379 (June 6, 2014).

[67] USPTO, CLASSIFICATION DEFINITIONS: CLASS 705 (Jan. 2012),
https://www.uspto.gov/web/patents/classification/uspc705/defs705.pdf

[68] This study uses the same supercategory conversion system first defined by Professors Bronwyn Hall, Adam Jaffe, and Manuel Trajtenberg in their scholarship for the National Bureau of Economic Research. *See* Bronwyn H. Hall et al., *The NBER Patent Citations Data File: Lessons, Insights, and Methodological Tools* 13 (Nat'l Bureau of Econ. Research, Working Paper No. 8498, 2001). The conversion system was thereafter updated and refined by Professor Lucy Wang. *See* Lucy Xiaolu Wang, *Patent Classification Systems and Technological Categorization: An Overview and Data Update* (Aug. 2, 2018), https://ssrn.com/abstract=3220033. Although this supercategory system is not necessarily unique, it is in particularly common use. *See, e.g.*, Saurabh Vishnubhakat et al., *Strategic Decision Making in Dual PTAB and District Court Proceedings*, 31 BERKELEY TECH. L.J. 45 (2016); Gregory Nemet & Evan Johnson, *Do Important Inventions Benefit from Knowledge Originating in Other Technological Domains?*, 41 RES. POL'Y 190 (2012); Alberto Galasso & Mark Schankerman, *Patent and Cumulative Innovation: Causal Evidence from the Courts*, 130 Q.J. ECON. 317 (2014); Shawn P. Miller, *Where's the Innovation: An Analysis of the Quantity and Quality of Anticipated and Obvious Patents*, 18 VA. J.L. & TECH. 1 (2013).

replaced by the more globally uniform Cooperative Patent Classification System (CPC),[69] and so was not available for a minority of patents in the dataset. For those, the relevant CPC title was used for supercategory sorting instead.[70]

The dataset thus offers a fairly robust picture of § 101 adjudication at the Federal Circuit, while attempting to maintain mechanical objectivity in all aspects of coding to the maximum extent feasible. Nevertheless, once coding is complete, the author will perform intercoder reliability tests with trained research assistants,[71] to ensure no systemic biases or errors occurred as a result of the small degree of subjectivity that coding required.

Part III presents the preliminary results in detail. One great strength of this study is that the dataset is not a sample, but rather the entire population of relevant Federal Circuit cases. Accordingly, there need not be any concerns about representativeness or skewed sampling at the Federal Circuit level. Moreover, panel assignments are random, making this a natural experiment in the strict sense for purposes of the core question on panel dependence. At the same time, the results below should not—and could not—be used to represent the overall universe of § 101 decision making. Any conclusions drawn must be tailored to that limitation, to avoid selection effects regarding which § 101 disputes are litigated, which are appealed, and so on.

III.   ANALYSIS

Starting at the highest level, the raw proportion of § 101 outcomes on appeal is presented below by judge. The data has been sorted by the judges' rate of authoring or joining decisions finding § 101 eligibility, out of their total number of § 101 decisions authored or joined:

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[69] *See generally Patent Classification*, U.S. PATENT & TRADEMARK OFFICE,
https://www.uspto.gov/patents/search/classification-standards-and-development.
[70] For example, Patent No. 6,349,291 (entitled "Method and system for analysis, display and dissemination of financial information using resampled statistical methods") is labeled by the USPTO as within CPC class G06: "Computing; Calculating; Counting." In turn, this readily matches the "computers and communications" supercategory.
[71] Intercoder reliability refers to the extent to which independent coders identically evaluate the same materials. *See generally* Matthew Lombard et al., *Practical Resources for Assessing and Reporting Intercoder Reliability in Content Analysis Research Projects* (June 1, 2010), http://matthewlombard.com/reliability/index_print.html.

Table 1: Raw § 101 Eligibility Rates by Judge

	§ 101-Eligible Decisions	§ 101-Ineligible Decisions	Total § 101 Decisions	§ 101-Eligible Rate	Pearson Chi-Square
Rader	2	3	5	60%	0.004**
Plager	5	7	12	58.3%	<.001**
Newman	34	12	46	26.1%	0.022**
Moore	71	21	92	22.8%	0.013**
Bryson	24	6	30	20%	0.411
Stoll	60	13	73	17.8%	0.432
O'Malley	44	9	53	17.0%	0.643
Linn	22	3	25	12%	0.674
Lourie	74	10	84	12.0%	0.38
Wallach	64	8	72	11.1%	0.314
Reyna	73	9	82	11.0%	0.257
Schall	19	2	21	9.5%	0.477
Hughes	64	6	70	8.6%	0.098*
Taranto	74	6	80	7.5%	0.035**
Dyk	62	5	67	7.5%	0.058*
Prost	76	5	81	6.2%	0.012**
Chen	58	3	61	4.9%	0.016**
Clevenger	24	1	25	4%	0.113
Gajarsa	3	0	3	0%	0.467
Mayer	18	0	18	0%	0.069*

First, observe that there is a very low overall rate of finding § 101 eligibility on appeal. In total, only 14.8% of the decisions in the dataset found § 101-eligible subject matter. Second, some of the more senior judges (Rader, Plager, Schall, Gajarsa, and Mayer) have a very small number of total § 101 decisions. This too should not be surprising; although the Federal Circuit was created in 1982,[72] § 101 cases are relatively rare prior to 2008. Until *In re Bilski*,[73] patentable subject matter "was effectively a dead letter" with few exceptions.[74] Third, the chi-square statistics indicate that between seven (p < .1)* and ten (p < .05)** of the Federal Circuit judges already exhibit a significant relationship with § 101 eligibility: Rader, Plager, Newman, Moore, Hughes, Taranto, Dyk, Prost, Chen, and Mayer. But of those, three (Rader, Plager, and Mayer) have so few decisions in the dataset that little can be reasonably inferred.

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[72] *See supra* note 31.

[73] 545 F.3d 943 (Fed. Cir. 2008) (en banc).

[74] Mark A. Lemley et al., *Life After* Bilski, 63 STANFORD L. REV. 1315, 1318 (2011) ("Through the 1980s and 1990s, courts gradually eroded the requirement that a software invention be tied to a particular machine. . . . [P]atentable subject matter was effectively a dead letter. That changed dramatically in 2008 when the Federal Circuit decided *In re Bilski* en banc.").

Two immediate refinements to this raw data are appropriate. The vast majority of points in the dataset (all but 16) involve the Federal Circuit explicitly invoking the standard set forth between *Alice* and *Mayo*. Because those cases clearly heightened the standard for § 101 eligibility, data points arising under earlier, more lenient § 101 standards are hereafter dropped from the analysis to maximize comparability between judges. Next, judges with a trivial number (20 or fewer) of § 101 decisions remaining in the set have been dropped from the table to avoid over-interpreting their limited data:

Table 2: § 101 Eligibility Rates by Judge

	§ 101-Eligible Decisions	§ 101-Ineligible Decisions	Total § 101 Decisions	§ 101-Eligible Rate	Pearson Chi-Square
Newman	29	9	38	23.7%	0.108
Moore	65	20	85	23.5%	0.01**
Bryson	21	6	27	22.2%	0.267
O'Malley	41	9	50	18.0%	0.508
Stoll	60	13	73	17.8%	0.434
Linn	18	3	21	14.3%	0.932
Lourie	72	10	82	12.2%	0.425
Wallach	63	8	71	11.3%	0.33
Reyna	71	9	80	11.3%	0.29
Hughes	62	6	68	8.8%	0.114
Dyk	58	5	63	7.9%	0.084*
Taranto	72	6	78	7.7%	0.041**
Prost	71	5	76	6.6%	0.02**
Chen	57	3	60	5%	0.017**
Clevenger	23	1	24	4.2%	0.125

As a result of these changes, the overall rate of finding § 101 eligibility increases very slightly (to 14.9%) and only Judges Moore, Dyk, Taranto, Prost, and Chen remain as exhibiting a significant relationship with § 101 eligibility. Specifically, Judge Moore is strongly associated with § 101 eligibility; Judges Dyk, Taranto, Prost, and Chen is strongly associated with § 101 eligibility.

Two binary logistic regressions follow below. The dependent variable of interest is binary: the Federal Circuit's determination of § 101 eligibility (1) or ineligibility (0). For the first regression, the only independent variables are a series of binary variables, one for each judge in the set, indicating whether they wrote or joined the § 101 decision in question (1) or not (0). For the second regression, the following independent variables are added in:

- A continuous variable for the year of the Federal Circuit's opinion;

- A dummy variable for the § 101 determination made by the tribunal below—eligible (1) or ineligible (0);

- A dummy variable for whether the decision below came from the USPTO (1) or a district court (0); and

- A series of binary variables, one for each of the NBER patent technology class supercategories.

Table 3: Participating Judges and § 101 Eligibility

	B	S.E.	Wald	df	Sig.	Exp(B)
Newman	-.040	.544	.005	1	.941	.961
Moore	.435	.406	1.143	1	.285	1.544
Bryson	-.080	.574	.020	1	.889	.923
O'Malley	-.717	.486	2.175	1	.140	.488
Stoll	-.089	.441	.041	1	.840	.915
Linn	-1.391	.760	3.347	1	.067*	.249
Lourie	-1.157	.458	6.391	1	.011**	.314
Wallach	-1.231	.492	6.244	1	.012**	.292
Reyna	-1.291	.477	7.321	1	.007**	.275
Hughes	-1.626	.547	8.841	1	.003**	.197
Dyk	-1.474	.554	7.073	1	.008**	.229
Taranto	-1.604	.500	10.301	1	.001**	.201
Prost	-1.668	.558	8.930	1	.003**	.189
Chen	-1.955	.644	9.212	1	.002**	.142
Clevenger	-2.051	1.092	3.528	1	.060*	.129
Constant	.567	.590	.925	1	.336	1.763

Summary Statistics

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
226.560	.153	.269

First, consider the R^2 statistics presented directly above, which suggest that somewhere between 15.3% and 26.9% of the variation in the dependent variable (§ 101 eligibility) can be explained by the independent variables (judge identities) provided alone. Next, note the large number of judges whose variables turn out to be significant: 10 out of 15. There are, of course, other factors that one would expect to influence the outcome of § 101 eligibility as well—factors like the outcome below, the case's tribunal of origin, and the type of technology at issue. The following regression incorporates those additional variables.

Table 4: All Variables and § 101 Eligibility

	B	S.E.	Wald	df	Sig.	Exp(B)
Newman	.839	.631	1.769	1	.183	2.315
Moore	1.023	.491	4.340	1	.037**	2.781
Bryson	.461	.712	.419	1	.517	1.586
O'Malley	-.401	.559	.514	1	.473	.670
Stoll	.472	.520	.827	1	.363	1.604
Linn	-.738	.784	.885	1	.347	.478
Lourie	-1.060	.522	4.123	1	.042**	.346
Wallach	-1.107	.578	3.669	1	.055*	.330
Reyna	-.892	.538	2.748	1	.097*	.410
Hughes	-1.183	.589	4.037	1	.045**	.306
Dyk	-1.239	.619	4.012	1	.045**	.290
Taranto	-1.156	.576	4.031	1	.045**	.315
Prost	-1.243	.641	3.764	1	.052*	.289
Chen	-1.509	.686	4.845	1	.028**	.221
Clevenger	-1.871	1.150	2.649	1	.104	.154
Year	.151	.096	2.467	1	.116	1.163
§ 101 Below	1.375	.567	5.885	1	.015**	3.955
USPTO	-2.826	1.097	6.637	1	.010**	.059
Chemical	-.588	1.067	.303	1	.582	.555
Comp. & Comm.	-1.472	.927	2.522	1	.112	.229
Drugs & Med.	-.060	.846	.005	1	.944	.942
Elec. & Elecs.	-1.920	.967	3.946	1	.047**	.147
Mechanical	-.805	1.207	.445	1	.505	.447
Other	-1.157	1.067	1.176	1	.278	.314
Constant	-303.623	193.891	2.452	1	.117	.000

Summary Statistics

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
191.252	.238	.418

Starting again with the R^2 statistics, observe that between 23.8% and 41.8% of the variation in § 101 eligibility can be explained by the full set of independent variables provided. This is an increase from the prior range of 15.3% to 26.9%, to be sure, but a surprisingly weak increase. Running another regression for comparative purposes—on only the *non*-judge independent variables—yields a somewhat disappointing range of 13.3% to 23.3%. That is to say: it appears more useful for outcome-predictive purposes to know the panel's composition than the result below, where it came from, and the type of invention at issue. Next, note that 9 judge variables remain significant, even after taking into account the other case characteristics; the inclusion of those additional variables does not substantially reduce the predictive value of judge identity.

In short, these results all seem to confirm a non-trivial degree of panel dependency with respect to § 101 eligibility. But these cross-tabulations and regressions likely underestimate panel dependence, if anything, simply due to the nature of three-judge panels. A judge's binary variable may be "0" for a given decision because they dissented from the majority on the merits—or instead because they simply weren't assigned to the case. Put differently, even a hypothetical judge who decided against § 101 eligibility in every single case on which they sat would still receive a "0" for a tremendous number of § 101-ineligible decisions. Moreover, there are likely compromises made and moderating forces felt between some judges (but not others) when they sit together on a panel. The attempt to isolate judges' individual effects sheds much light but, at bottom, the inquiry is about *panel* dependence.

One potential approach would therefore be cross-tabulations or regressions looking at all possible judge pairs. Two judges are all that's needed for a majority opinion, and so pairs of judges more accurately reflect true decision-making power. At the same time, such an approach would create hundreds of judge-pair variables across the 15 judges used. This seriously risks creating spurious statistical results from sheer random chance alone. Looking at full judge trios would only exacerbate the problem exponentially.

To better approximate the cumulative, rather than individual effects of the judges, the author last offers an approach similar to that of Professors Wagner and Petherbridge in their research on claim construction panel dependence.[75] Judges are first sorted into 3 categories based on their apparent approach to § 101 eligibility: (1) "lenient" judges (those with the top 5 eligibility rates from Tbl. 2); "strict" judges (bottom 5); and "swing" judges (middle 5). Panel compositions based on these categories are then calculated for each majority decision regarding § 101. The relationship between panel composition and § 101 outcome is presented below.

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[75] Wagner & Petherbridge, *supra* note 33, at 1160-67.

Table 5: Panel Composition and § 101 Eligibility

		§ 101-Eligible Decisions	§ 101-Ineligible Decisions
Lenient Judges Empanelled	**0**	5 (5.6%)	85 (94.4%)
	1	25 (13.9%)	155 (86.1%)
	2	13 (28.9%)	32 (71.1%)
	3	1 (100%)	0 (0%)
Strict Judges Empanelled	**0**	25 (25.3%)	74 (74.7%)
	1	15 (10.5%)	128 (89.5%)
	2	3 (4.6%)	62 (95.4%)
	3	9 (100%)	0 (0%)
Total		43 (13.6%)	273 (86.4%)

For the lenient judges table, the Pearson Chi-Square is 14.072, with p = .003. For the strict judges table, the Pearson Chi-Square is 18.491, with p < .001. As panel composition tilts towards judges with lenient § 101 views, the rate of § 101-eligible decisions increases. In particular, gaining a second—majority-holding—lenient judge doubles the odds of § 101 eligibility over a single lenient judge. Meanwhile, as panel composition tils towards judges with strict § 101 views, the rate of § 101-eligible decisions decreases. Securing a majority of strict judges halves the odds of § 101 eligibility over a single strict judge.

Altogether, these preliminary results seem to collectively suggest panel-dependent outcomes for § 101 eligibility. Thank you for the opportunity to hear your thoughts at this intermediary stage in particular, to better allow for course corrections and improvements as the project goes forward.