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CHARTING SUPREME COURT PATENT LAW, NEAR AND FAR

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I would not care to match wits with Seth Waxman, one of the leading Supreme Court advocates practicing in the United States today.[1] I am willing, however, to proffer an epigram I find no less fitting than the one with which he began.[2] Mine: "*Plus ça change, plus c'est la même chose*"—the more it changes, the more it's the same thing.[3] When we take a longer view of the Supreme Court's opinions in patent cases and other intellectual property law cases, we can see vital continuities that run through this body of judge-made law, binding it together in a stable fabric. It is a longer view that I offer here, based on a citation study of cases that uses network-analysis metrics and force-mapping data visualization tools.[4] I examine the 1947–2017 span, as well as the half-spans from 1947 to 1982, and from 1982 to 2017. This embraces both the 35-year period following the Federal Circuit's

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1. *See generally* Joan Biskupic et al., *The Echo Chamber*, REUTERS INVESTIGATES (Dec. 8, 2014, 10:30 AM GMT) (reporting results of an empirical study of private-lawyer success rates in petitioning for U.S. Supreme Court review from 2004 to 2012), https://www.reuters.com/investigates/special-report/scotus/. According to WilmerHale's web site, Mr. Waxman, a partner there, has argued 75 cases at the Supreme Court to date. https://www.wilmerhale.com/seth_waxman/ (last visited Feb. 6, 2018).

2. Seth P. Waxman, *May You Live In Interesting Times: Patent Law in the Supreme Court*, 17 CHI.-KENT J. OF INTELL. PROP. 214, 214 (2017).

3. Jean-Baptiste Alphonse Karr, *Les Guêpes* [The Wasps], Jan. 1849. Scanned copies of the work are readily available at https://archive.org. In the 1862 printing of Series 6, the epigram appears at the end of the first full paragraph on page 305, https://archive.org/details/lesgupes06karruoft. *Cf.* Mark A Lemley, *The Surprising Resilience of the Patent System*, 95 TEX. L. REV. 1, 2 (2016) ("Despite the undeniable significance of these changes . . . something curious has happened to the fundamental characteristics of the patent ecosystem during this period [from the 1990s to 2015]: very little. Whether we look at the number of patent applications filed, the number of patents issued, the number of lawsuits filed, the patentee win rate in those lawsuits, or the market for patent licenses, the data show very little evidence that patent owners and challengers are behaving differently because of changes in the law. The patent system, in other words, seems surprisingly resilient to changes in the law.").

4. *See generally* Joseph Scott Miller, *Which Supreme Court Cases Influenced Recent Supreme Court IP Decisions? A Citation Study*, 21 UCLA J.L. & TECH. 1, 10–15, 29–43 (2017) (describing and applying these network-analysis metrics and data-visualization tools to a smaller citation study of U.S. Supreme Court opinions in intellectual property law cases decided from October 1994 to June 2017).

creation in 1982[5]—the focus of Waxman's reflections[6]—and the 35-year period leading to that 1982 turning point.

1. There are two points on which Waxman and I entirely agree. First, he notes the "uptick" in the Supreme Court's patent-case rate, during a time when the overall number of the Court's merits cases has declined.[7] Waxman compares the 17 patent cases decided from 1983 to 2006, or about 0.7 cases per year, to the 33 cases decided from 2006 to 2017, or 3 cases per year. One can also consider the rolling five-year average of patent cases per Supreme Court term, to gauge change annually. By my count, the rolling five-year average of Supreme Court patent cases is, after the October 2016 Term, at 4 per Term[8]—a level not seen since the 1940s.[9] Copyright and trademark cases, by contrast, are at a rolling five-year average of 2 cases per Term *combined*, suggesting that there is not simply an increased interest in, or recognition of the importance of, all intellectual property cases equally.[10] Since the October 2005 Term, patent cases dominate the Court's IP docket to a notable degree.

Second, as Waxman observes, "[o]verwhelmingly, what matters to the Court are its own cases and the express statutory text."[11] Multiple citation studies show that supreme courts, including the U.S. Supreme Court, generally cite their own cases more often than those of any other court.[12] That pattern holds in the Court's intellectual property cases from 1994 to 2017.[13] "Any court with a significant stock of its own opinions shows a marked preference for citing them."[14]

Perhaps he and I also agree that the greater number of recent Supreme Court patent-law decisions is neither all boon nor all bane. Waxman does, however, urge the Court to slow its patent-law roll: "I hope that, going forward, the Court will take stock of the substantial changes it has already

5. Federal Courts Improvement Act, Pub. L. No. 97-164, § 127, 96 Stat. 25, 37 (1982); *see generally* Harold C. Petrowitz, *Federal Court Reform: The Federal Courts Improvement Act of 1982-And Beyond*, 32 AM. U. L. REV. 543, 553–57 (1983) (describing the then-new Federal Circuit's creation).

6. Waxman, *supra* note 2, at 215 & n.8.

7. *Id.* at 215–16.

8. Miller, *supra* note 4, at 3 & fig.1.

9. John F. Duffy, *The Federal Circuit in the Shadow of the Solicitor General*, 78 GEO. WASH. L. REV. 518, 520–22 & figs.1, 2 (2010) (reporting per-Term patent-case rates from 1810 to 2007).

10. Miller, *supra* note 4, at 3 & fig.1.

11. Waxman, *supra* note 2, at 222.

12. Miller, *supra* note 4, at 6–8 (discussing four such studies).

13. *Id.* at 19–20 (reporting citation data for such cases).

14. William H. Manz, *Citations in Supreme Court Opinions and Briefs: A Comparative Study*, 94 L. LIB. J. 267, 269 (2002). Manz reports, for example, that "almost 70% of the cases cited in the Court's majority opinions during the 1996 Term were Supreme Court decisions." *Id.* at 269–70 & tbl.3.

wrought and their effect as it considers further adjustments."[15] He grounds the recommendation in concerns about the greater *pace* of change ("the pace of change has been so rapid that no one knows the full effect of the Court's decisions"[16]), as well as the *direction* of change ("general impressions that something is not right in the state of patent law seem to have contributed over time to a greater willingness to second-guess the Federal Circuit"[17]) and the *character* of change ("reflect[ing] the age-old debate about rules and standards," the "Federal Circuit has traditionally been more inclined to adopt rules," whereas the "Supreme Court, by contrast, has a high tolerance for uncertainty"[18]).

My view of the desirability of continued Supreme Court review of multiple patent cases per Term is much closer to that of Federal Circuit Judge Dyk: "Supreme Court review of [Federal Circuit patent] cases is both essential and highly beneficial."[19] That review cannot help but change patent doctrine, to be sure.[20] But some of the change simply returned patent law to the course that the Supreme Court had already set, and that the Federal Circuit had failed to heed. For example, in *TC Heartland*, a unanimous Supreme Court restored the patent venue statute's "resides" clause to the construction the Court had given it six decades earlier.[21] In *KSR*, a unanimous Court restored to the nonobviousness inquiry the "expansive and flexible approach"

15. Waxman, *supra* note 2, at 219–220 ("One solution would be for the Court to pause for a time and let the changes it has already made sink in.").

16. *Id.*

17. *Id.* at 219.

18. *Id.* at 221. The 'Federal Circuit rules v. Supreme Court standards' contrast can be overdrawn. The Court does sometimes prefer standards to rules, as Waxman describes. *Id.* at 220–21. But sometimes the Court prefers a rule to a standard, as in the "on-sale bar" context. *See* Pfaff v. Wells Elecs., 525 U.S. 55, 65–66 & n.11 (1998) (rejecting the Federal Circuit's "totality of the circumstances" test in favor of a two-step "ready for patenting" test). More importantly, many of the Court's recent patent cases are not fought on the 'rules v. standards' field at all, involving issues such as: the scope of Seventh Amendment jury rights, *Markman v. Westview Instruments, Inc.*, 517 U.S. 370 (1996); interactions between the Patent Act and other federal statutes, *e.g.*, *Caraco Pharma. Labs. v. Novo Nordisk A/S*, 132 S. Ct. 1670 (2012); the scope of federal jurisdiction, *e.g.*, *Gunn v. Minton*, 133 S. Ct. 1059 (2013); burdens of proof, *e.g.*, *Medtronic, Inc. v. Mirowski Family Ventures, LLC*, 134 S. Ct. 843 (2014); the scope of judicial review of agency action, *e.g.*, *Dickinson v. Zurko*, 527 U.S. 150 (1990); the scope of indirect infringement liability, *e.g.*, *Commil USA, LLC v. Cisco Sys.*, 135 S. Ct. 1920 (2015); and the presumption against extraterritorial effect for federal statutes, *Microsoft Corp. v. AT&T Corp.*, 550 U.S. 437 (2007).

19. Timothy B. Dyk, *Thoughts on the Relationship Between the Supreme Court and the Federal Circuit*, 16 CHI.-KENT J. INTELL. PROP. 67, 83–84 (2016).

20. *See id.* at 72–77 (discussing some of these changes).

21. TC Heartland LLC v. Kraft Foods Grp. Brands LLC, 137 S. Ct. 1514, 1516–17 (2017) ("In *Fourco Glass Co. v. Transmirra Products Corp.*, 353 U.S. 222, 226 (1957), this Court concluded that for purposes of [28 U.S.C.] § 1400(b) a domestic corporation 'resides' only in its State of incorporation. . . . We conclude that the amendments to [28 U.S.C.] § 1391 did not modify the meaning of § 1400(b) as interpreted by *Fourco*. We therefore hold that a domestic corporation 'resides' only in its State of incorporation for purposes of the patent venue statute.").

the Court had prescribed four decades earlier in *Graham*.[22] In *Festo*, a unanimous Court restored the prosecution-history-estoppel inquiry to a calibration method the Court had endorsed six decades earlier in *Exhibit Supply* and refined just five years before in *Warner-Jenkinson*.[23] These are doctrinal changes of a kind, but they also reflect a deeper continuity in the structural relationship between the Supreme Court and the subordinate federal courts in the construction and application of federal law. And even in a case that turns on a patent-law question that the Court has not previously considered—such as the laches question at the heart of *SCA Hygiene*,[24] as Waxman describes—the structural principle should inform parties' expectations about the contours of patent doctrine. Until the Supreme Court settles a patent law question, that question is not fully settled, as the Supreme Court itself stated plainly in 1888.[25] Professor Robin Feldman's assessment of the October 2013 Term's patent cases rings true, to me, more broadly: "[A] strong message echoes through the six Supreme Court decisions. It is a message about restraint, about carefully constructed logic, and about coming into the fold of judicial decision-making."[26]

Patent law is still *law*—exclusively federal law, at that. The Supreme Court oversees a complex set of interactions among legislative settlements of general policy directives,[27] executive administration under these

22. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 415 (2007) ("We begin by rejecting the rigid approach of the Court of Appeals. Throughout this Court's engagement with the question of obviousness, our cases have set forth an expansive and flexible approach inconsistent with the way the Court of Appeals applied its TSM test here. . . . [T]he principles laid down in *Graham* [*v. John Deere Co.*, 383 U.S. 1 (1966)] reaffirmed the 'functional approach' of *Hotchkiss* [*v. Greenwood*, 52 U.S. (11 How.) 248 (1851)]. To this end, *Graham* set forth a broad inquiry and invited courts, where appropriate, to look at any secondary considerations that would prove instructive.") (internal citation omitted).

23. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 737–41 (2002) (discussing Warner–Jenkinson Co. v. Hilton Davis Chemical Co., 520 U.S. 17 (1997), and Exhibit Supply Co. v. Ace Patents Corp., 315 U.S. 126 (1942)).

24. SCA Hygiene v. First Quality Baby Prods., 137 S. Ct. 954 (2017).

25. *See* Andrews v. Hovey, 124 U.S. 694, 716–17 (1888) ("A question arising in regard to the construction of a statute of the United States concerning patents for inventions cannot be regarded as judicially settled when it has not been so settled by the highest judicial authority which can pass upon the question. . . . No question arising in any such case, reviewable by this court, can be regarded as finally settled, so as to establish the law for like cases, until it has been determined by this court.").

26. Robin Feldman, *Coming of Age for the Federal Circuit*, 18 GREEN BAG 2d 27, 27–28 (2014).

27. The Patent Act's text is quite open textured, more like the Sherman Act than the Internal Revenue Code. *See* John F. Duffy, KSR v. Teleflex: *Predictable Reform of Patent Substance and Procedure in the Judiciary*, 106 MICH. L. REV. FIRST IMPRESSIONS 34, 37 (2007) ("Although patent law is a creature of federal statute, it has long been dominated by judicially-created common law. As in antitrust (that 'other' branch of federal monopoly law), the key statutory provisions fairly exude ambiguity."); *see also* Craig Allen Nard, *Legal Forms and the Common Law of Patents*, 90 B.U. L. REV. 51, 53 (2010) (same). This is another point on which Waxman and I agree. *See* Waxman, *supra* note 2, at 222–23 (noting that "the Patent Act is notably not a comprehensive statement of patent law," and that "[m]any patent doctrines, arising from tort and equity, are not included in the text at all").

directives (albeit through a federal agency that is, compared to most, weak[28]), and judicial dispute resolution within that matrix of legislative and administrative material. The Court is playing its familiar role as the highest judicial tribunal responsible for the reasoned elaboration of federal law, including the federal law of judiciary-agency relations. It is supervising not only *patent* law, but also patent *law*, particularly the patent system's public infrastructure. From this perspective, it is critically important that the Court's regular review of patent cases should continue at a pace the Court itself thinks adequate.

The Court's sense of its structural role may also help explain another facet of its increased engagement with patent law—namely, the higher unanimity rate in these cases, together with the trademark and copyright cases. Waxman notes the high degree of agreement in the Court's 2016–17 patent cases,[29] but the phenomenon is more widespread than that. Consider the Court's 73 patent, trademark, and copyright cases from the October 1994 Term[30] through the October 2016 Term, inclusive. (A list of the cases, with the vote split in each, is set forth in the Appendix to this paper.) Patent cases dominate the group, with 47; trademark (14) and copyright (12) together comprise 26. Across these cases, the Court shows a remarkable level of internal agreement. Among the patent cases, 31 of 47 (66%) drew no dissent. Among all the IP cases together, 47 of 73 (64%) drew no dissent. For comparison, the unanimity rate across all the Court's merits cases, in recent decades, hovers at about 40%.[31] Waxman "find[s] it puzzling and somewhat

28. "Unlike the sweeping delegations [to agencies] conferred in the Progressive and New Deal eras, the delegations of governmental power for the patent system were, and still are, extraordinarily narrow." John F. Duffy, *The FCC and the Patent System: Progressive Ideals, Jacksonian Realism, and the Technology of Regulation*, 71 U. COLO. L. REV. 1071, 1133 (2000). The PTO may be stronger, at least in some discrete areas, due to broader rulemaking authority conferred by the 2011 America Invents Act. *See* Cuozzo Speed Techs. v. Lee, 136 S. Ct. 2131, 2142–46 (2016) (using *Chevron* deference, a familiar feature of judicial review of agency substantive rules, to affirm a PTO rule for construing patent scope during *inter partes* review of an issued patent under the America Invents Act); *see also* John M. Golden, *Working Without* Chevron*: The PTO as Prime Mover*, 65 DUKE L.J. 1657, 1671–91 (2016) (discussing judicial review of agency action in the PTO context, including changes occasioned by the America Invents Act); Sarah Tran, *Patent Powers*, 25 HARV. J.L. & TECH. 609 (2012) (same).

29. Waxman, *supra* note 2, at 222.

30. The October 1994 Term marks an inflection point in the Supreme Court's appetite for patent cases: "the 1994 Term was the beginning of a long-term trend. While the Court had decided only five patent cases in the first dozen Terms in which the Federal Circuit was in existence, its next five patent cases were decided in the four Terms after 1994 (1995–1998, inclusive). . . . In its next ten Terms (1999–2008, inclusive), the Justices would hear argument and issue opinions in eleven more Federal Circuit patent cases. Thus, unlike its anemic average . . . during the 1983–1994 Terms, the Court in the years since 1994 has averaged more than one patent case per Term . . . ." Duffy, *supra* note 9, at 523–24 (footnotes omitted).

31. LEE EPSTEIN ET AL., THE BEHAVIOR OF FEDERAL JUDGES: A THEORETICAL AND EMPIRICAL STUDY OF RATIONAL CHOICE 125–26 & fig.3.1 (upper right panel, labeled "Unanimous Maximum"). Put

troubling" that the votes in the patent cases seem "lopsided," worrying that, without the disciplining "internal check" of a "robust dissent," any "soft spots in the majority's reasoning are less likely to be rectified"—and expressing the related fear that the resulting opinions are, in effect, too short.[32] This may be cause for concern. At the same time, the more common criticism of the Court is that its opinions have become too long, complex, and fractured: "Many commentators contend Supreme Court opinions are excessively long and argue longer opinions result in a variety of negative consequences."[33] Among them is the risk of greater confusion in the lower courts, which itself may widen lower-court judges' discretion in how they implement those Supreme Court decisions in subsequent cases.[34] As reporter Adam Liptak pointedly observed in 2010, at a time when the Court "often provides only limited or ambiguous guidance to lower courts" *and* "increasingly does so at enormous length," it is well to remember that "*Brown v. Board of Education* . . . managed to do its work in fewer than 4,000 words."[35]

2. On the terrain Waxman deftly describes, we have common ground. The Court is hearing more patent cases, focusing most on its own precedents when it does so, and deciding them with greater unanimity than is typical of the Court's recent output. We also have some differences, where Waxman sees both more change, and more rapid change, than do I. In what remains, my goal is to *shift* the terrain, looking at the Court's IP cases over a longer time span, from 1947 to 2017, and from a citations-analysis perspective. My examination of the Court's citations to its own cases in this period persuades me that the recent changes in patent doctrine occur within a larger matrix of stability and continuity. In a snapshot of any short period, because the Court is deciding a cohort of discrete legal questions that may differ from the questions in some other short period, the pattern of cited precedents may seem to vary sharply. Viewed over a longer time period, however, the Court's citations show that it weaves each new case into the dense tapestry of existing

differently, since about 1950, about 60% of all the Court's cases contain at least one dissent. *Id.* at 68 & fig.2.1.

32. Waxman, *supra* note 2, at 222 ("Altogether, the Court's opinions in the four patent cases I argued last Term fill only 29 pages of the Supreme Court Reports, and the vast majority of those pages simply recited the relevant facts and legal principles.").

33. Ryan C. Black & James F. Spriggs, *An Empirical Analysis of the Length of U.S. Supreme Court Opinions*, 45 HOUS. L. REV. 621, 627 (2008) (reporting a comprehensive empirical study of the length of Supreme Court opinions and how it has changed over time).

34. *Id.* at 628 (describing this risk).

35. Adam Liptak, *The Roberts Court: Justices Long on Words but Short on Guidance*, N.Y. TIMES, Nov. 18, 2010, at A1, *available at* http://www.nytimes.com/2010/11/18/us/18rulings.html. The opinion in *Brown*, excluding the syllabus and lawyers' names, occupies 11 pages in the official reporter. *See* Brown v. Board of Educ., 347 U.S. 483, 486–96 (1954).

decisional law. The tapestry endures, even as it changes gradually in the embrace of new threads.

By way of background, it is simple enough to think of a set of judicial decisions and the citations linking them to one another as a network, with the cases as *nodes* in the network and the citations as *edges* connecting them.[36] Quantitative study of large case-law citation networks, however, is still quite new. Indeed, "until recently, large-scale analysis of citation practices were impractical; data was difficulty to acquire, analysis methods were rudimentary, and computational power was insufficient."[37] Happily, "[i]n the last decade, all three of the barriers to large-scale empirical citation analysis have been greatly reduced."[38] I have performed a citation-network analysis of the Supreme Court's IP cases from 1994 to 2017 and draw on that work here.[39]

Two network-analysis studies of U.S. Supreme Court opinions, both led by political scientist Professor James Fowler,[40] provide the foundation for the network analyses I present below. A critical feature of network analysis is that it allows one to differentiate nodes by their relative importance to—their *centrality*[41] in—the network. For example, both Fowler studies proceed from the premise that "[a] citation analysis is an ideal way to tap 'case importance' . . . define[d] as the legal relevance of a case for the network of law at the Supreme Court."[42] Because we can treat "a citation to a precedent as a latent judgment by a judge regarding the relevance of the case for helping to resolve a legal dispute," it is "reasonable to determine how relevant a particular opinion is by considering how," in granular detail, "it is embedded in the broader network of opinions comprising the law."[43] The Fowler studies

36. *See* Thomas A. Smith, *The Web of Law*, 44 SAN DIEGO L. REV. 309, 316–17 (2007) ("A network is just a set of items, termed *nodes* or *vertices*, with connections among them, termed *links* or *edges*. Networks are mathematical objects, but there are concrete examples everywhere. . . . The Web of Law is the network that consists of cases and other legal authorities, such as statutes, treatises, and law review articles (the nodes), and the citations that link them to one another.") (emphases in original) (footnote omitted).

37. Ryan Whalen et al., *Common Law Evolution and Judicial Impact in the Age of Information*, 9 ELON L. REV. 115, 120 (2017).

38. *Id.*

39. *See* Miller, *supra* note 4, at 10–15 (reviewing the key concepts and tools for conducting network analysis of case-law citation networks); *see also* Ryan Whalen, *Legal Networks: The Promises and Challenges of Legal Network Analysis*, 2016 MICH. ST. L. REV. 539, 547–50 (reviewing legal citation network studies).

40. *See* James H. Fowler & Sangick Jeon, *The Authority of Supreme Court Precedent*, 30 SOC. NETWORKS 16 (2008); *see also* James H. Fowler et al., *Network Analysis and the Law: Measuring the Legal Importance of Precedents at the U.S. Supreme Court*, 15 POL. ANALYSIS 324 (2007).

41. "A large volume of research on networks has been devoted to the concept of *centrality*. This research addresses the question, 'Which are the most important or central vertices in a network?'" M.E.J. NEWMAN, NETWORKS: AN INTRODUCTION 168 (Oxford Univ. Press 2010).

42. Fowler et al., *supra* note 40, at 325.

43. *Id.* at 326.

use mathematical tools developed to analyze social networks to map the case citation network "among all majority opinions released by the U.S. Supreme Court between 1791 and 2005."[44]

"There are of course many possible definitions of importance, and correspondingly many centrality measures for networks."[45] One way to quantify centrality, for each case/node in the network, is with a count of the links the case possesses. "The total number of links leading to and from each node is the 'degree,' where the *in degree* is the total number of inward citations and the *out degree* is the total number of outward citations."[46] It is "[p]erhaps the simplest centrality measure in a network," and doubtless "it can be very illuminating."[47] For example, in a body of scholarly literature, "[t]he number of citations a paper receives from other papers, which is simply its in-degree in the citation network, gives a crude measure of whether the paper has been influential or not and is widely used as a metric for judging the impact of scientific research."[48] And just so with a citation network that transits a set of judicial opinions: "At the most basic level one might use the number of inward citations, or *degree centrality*, to measure the importance of a given decision."[49]

> As the Fowler studies discuss, however, degree centrality is a second best, precisely because it treats every citing case's citation to a target case as having the same weight as every other—even though the very citation network under examination can provide information that negates the premise. As Fowler and Jeon explain, this measure does not fully use information in the precedent network because it treats all inward citations in exactly the same way. Ideally, we should be able to use information we obtain about the importance of cited cases to improve our estimate of the importance of the cases that they cite. For example, suppose decision *i* is

44. *Id.* at 327. The second of the studies uses a larger set of cases, but the addition of these cases from the mid-1700s contributes only minimally to the resulting citation network. Fowler & Jeon, *supra* note 40, at 18 & n.2.

45. NEWMAN, *supra* note 41, at 168–69; *see also* Iain Carmichael et al., Comment, *Examining the Evolution of Legal Precedent Through Citation Network Analysis*, 96 N.C. L. REV. 227, 230 (2017) ("There are many different ways to quantify the importance of a vertex in a network, called *vertex centrality metrics*.").

46. Fowler et al., *supra* note 40, at 328.

47. NEWMAN, *supra* note 41, at 169; *see also* Carmichael et al., *supra* note 45, at 230 ("Two of the simplest vertex centrality metrics are *in-degree* and *out-degree*.").

48. NEWMAN, *supra* note 41, at 169.

49. Fowler & Jeon, *supra* note 40, at 20.

> cited by a case that is considered to be very important and decision *j* is cited by a case that is not. This suggests that decision *i* may itself be more important than decision *j*.[50]

To illustrate this shortcoming of degree centrality using the network of Supreme Court IP cases that I analyze in detail below, consider *Zacchini v. Scripps-Howard Broadcasting Co.*,[51] a case involving a "human cannonball" performer's right-of-publicity claim against a broadcast television station. To date, the Supreme Court has cited *Zacchini* in two subsequent IP cases—*Harper & Row, Publishers, Inc. v. Nation Enterprises*[52] (a copyright fair use case), and *San Francisco Arts & Athletics, Inc. v. United States Olympic Committee*[53] (a congressionally-mandated-trademark case). In this network, *Zacchini* has a degree centrality score of two, with *Harper & Row* and *SFAA* each contributing one point. To date, however, the Supreme Court has cited *Harper & Row* in eight subsequent IP cases,[54] but cited *SFAA* in only two subsequent IP cases.[55] The degree centrality metric makes no use of that information, even though the greater weight of *Harper & Row*, compared to *SFAA*, is evident *in the very citation network they share* with *Zacchini*.

There is need, then, of a centrality metric that *does* value inward citations according to the centrality of the cases from which they originate. There is more than one available.[56] The Fowler studies test the utility, for judicial case-citation networks, of a centrality metric that information scientist Professor Jon Kleinberg developed to organize web pages for topical searches.[57] The metric, now known in the network-analysis literature as "hubs and

50. *Id.* at 20.

51. 433 U.S. 562 (1977). The federal question in *Zacchini* was whether the broadcaster's free press rights to publish news about the performance immunized it against the performer's right-of-publicity claim. *Id.* at 565–66. The Court's answer, in brief, was "no."

52. 471 U.S. 539, 557 (1985).

53. 483 U.S. 522, 533 (1987).

54. *See* Golan v. Holder, 565 U.S. 302, 326 (2012); *see also* Eldred v. Ashcroft, 537 U.S. 186, 219 (2002); New York Times Co. v. Tasini, 533 U.S. 483, 495 n.3 (2001); Campbell v. Acuff-Rose Music, Inc., 510 U.S. 569, 577 (1994); Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 345 (1991); Stewart v. Abend, 495 U.S. 207, 223 (1990); San Francisco Arts & Athletics, Inc. v. United States Olympic Comm., 483 U.S. 522, 541 n.19 (1987); Dowling v. United States, 473 U.S. 207, 216–17 (1985).

55. *See* Matal v. Tam, 137 S. Ct. 1744, 1752 (2017); *see also Eldred*, 537 U.S. at 221.

56. *See* NEWMAN, *supra* note 41, at 169–81 (describing eigenvector, Katz, PageRank, and hubs & authorities centrality measures); *see also* Carmichael et al., *supra* note 45, at 237–38 (discussing the "class of eigenvector centrality metrics," which "judge a case to be more important if it is cited by many cases that are themselves cited by many other cases" and include "PageRank, Eigenvector centrality, and hubs and authorities") (footnotes omitted).

57. *See* Jon M. Kleinberg, *Authoritative Sources in a Hyperlinked Environment*, 46 J. ASSOC. FOR COMPUTING MACHINERY 604, 605 (1999) ("In particular, we focus on the use of links for analyzing the collection of pages relevant to a broad search topic, and for discovering the most 'authoritative' pages on such topics.").

authorities," is the output of "a centrality algorithm called *hyperlink-induced topic search* or *HITS*."[58]

Fowler and Jeon explain the Kleinberg algorithm's capacity "to draw on both inward and outward citations for assessing importance,"[59] in a manner that is readily accessible even to one who cannot write an implementing algorithm. Specifically:

> A *hub* is a case that cites many other decisions, helping to define which legally relevant decisions are pertinent to a given precedent, while an *authority* is a case that is widely cited by other decisions. Most cases act as both hubs and authorities, and the degree to which cases fulfill these roles is mutually reinforcing within the precedent network. A case that is a *good hub* cites many *good authorities*, and a case that is a *good authority* is cited by many *good hubs*. . . . The resulting [numerical] hub and authority scores allow us to identify the key precedents in the network—precedents that are influential (authorities) and precedents that are well founded in law (hubs).[60]

Using the authority or hub scores computed for each node in a case-citation network, then, one can rank order the included cases by importance.[61] Fowler and Jeon, to test the validity of authority score as a centrality metric, used the subject-matter categories tracked in the Spaeth Supreme Court Database[62] to identify the top five cases by authority score, from 1953 to 2000, in four topical areas.[63] Those same cases are highlighted for importance in expert-opinion-based guides: Congressional Quarterly's 1997 *Guide to the United States Supreme Court*, the 1999 *Oxford Guide to Supreme Court Decisions*, and the 2005 Legal Information Institute list.[64] In

58. NEWMAN, *supra* note 41, at 178–79.

59. Fowler & Jeon, *supra* note 40, at 20.

60. *Id.* (emphasis in original); *accord* Kleinberg, *supra* note 57, at 611 ("Hubs and authorities exhibit what could be called a *mutually reinforcing relationship*: a good *hub* is a page that points to many good authorities; a good *authority* is a page that is pointed to by many good hubs.") (emphasis in original).

61. Widely available software for conducting network analysis and creating data visualizations, such as the open-source application Gephi, https://gephi.org/, computes authority and hub scores as a matter of routine. I used Gephi to compute the authority scores and create the visualizations presented below.

62. The Spaeth data set has provided the basis for a wealth of political science research on Supreme Court decision making. For a rich exploration of the core findings in the field, the interested reader should see Epstein et al., *supra* note 31, at chs. 2–3, 6.

63. Fowler & Jeon, *supra* note 40, at 23 tbl.3.

64. *Id.* at 20 (describing these sources), 23 tbl.3 note.

addition, annualized graphs of individual case's authority scores do a stunningly effective job charting the way that overruling precedents rise up and displace the authority of the cases they overrule,[65] and the way that a case's importance can rise and fall as the issue-set of interest to the Court shifts over time.[66] The Kleinberg authority score serves, in short, as a valid measure of a case's importance within a citation network of judicial opinions.

A streamlined example with a hypothetical set of case citations helps illustrate the authority score as a network centrality metric. The earliest case in the line is A. Subsequent cases B, C, D, and E each cite to A. E also cites to B, as do cases F, G, and H. All told, the cases run from A to O; one can list those that cite outward to earlier cases in a column labeled "Source," and those that receive cites inward from later cases in a column labeled "Target." In the network analysis literature, this is known as an *edge list*.[67] Figure 1 fully states the edge list for this simple case citation network.

Source	Target
B	A
C	A
D	A
E	A
O	A
E	B
F	B
G	B
H	B
H	C
I	C
J	C
K	C
O	C
K	D
L	D
M	D
N	D
O	D
O	K

Figure 1: Illustrative Edge List for a Citation Network

Using network analysis and graphing software, such as Gephi,[68] one can also visualize the nodes and edges of this network in varied of ways.[69] A common form of visualization uses a mapping algorithm to spread out nodes and edges in a readable way. The algorithm I used to create the visualizations presented here—ForceAtlas2—provides "a force directed layout: it simulates a physical system in order to spatialize a network. Nodes repulse each other like charged particles, while edges attract their nodes, like springs. The forces create a movement that converges to a balanced state."[70] The network graph depicts that balanced state. To better understand the clustering of nodes within the network, one can also apply a separate algorithm for "community detection," *i.e.*, "divid[ing] the vertices" or nodes "so that the groups formed are tightly

65. *Id.* at 25–26, 26 fig.7.

66. *Id.* at 26–27, 27 figs.8 & 9; *see also id.* at 28 ("[A]uthority scores conform to qualitative assessments about which issues and cases the Court prioritizes and how these change over time").

67. *See* NEWMAN, *supra* note 41, at 300–01.

68. *See* Gephi, *supra* note 61.

69. *See* NEWMAN, *supra* note 41, at 8 ("Visualization can be an extraordinarily useful tool in the analysis of network data, allowing one to see instantly important structural features of a network that would otherwise be difficult to pick out of the raw data.").

70. Mathieu Jacomy et al., *ForceAtlas2, a Continuous Graph Layout Algorithm for Handy Network Visualization Designed for the Gephi Software*, 9(6) PLOS ONE 2 (2014).

knit with many edges inside [the] groups and only a few edges between groups."[71] Gephi provides both a community detection algorithm and a convenient means for assigning a common color to the nodes and edges in a given case cluster. Applying this algorithm, known as Modularity, to the nodes in a ForceAtlas2 map of the citations in Figure 1 produces a graph with three clusters. The map is in Figure 2. All the nodes, and their labels, are the same size.

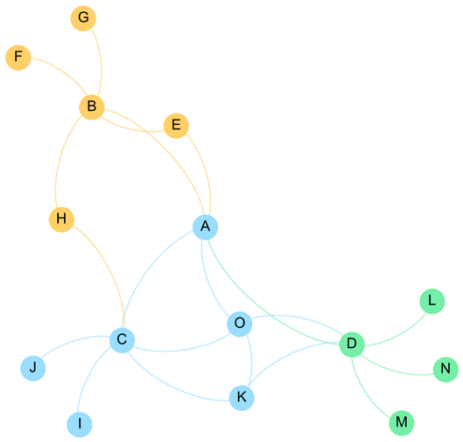


Figure 2

What of the authority-score data? Before looking at the scores Gephi computes for this network, consider the matter intuitively. Cases A, C, and D each have an in-degree of 5, compared to Case B's in-degree of 4; their authority scores should be higher than B's. Cases E through O each have an in-degree of 0; their authority scores should be 0. Case O has an out-degree of 4, so its hub score should be high. Case A cites nothing, so its hub score should be 0. Finally, Case C is cited by both Cases O (likely to have a high hub score) and K (itself cited by O, boosting its centrality), suggesting it may have the highest authority score. These surmises are borne out by the authority and hub scores for the

Node	Authority Score	Hub Score
C	**0.5998**	0.1635
D	0.5549	0.1635
A	0.4741	0
B	0.2434	0.1635
K	0.2197	0.3981
O	0	**0.6373**
H	0	0.2907
E	0	0.2474
I	0	0.2068
J	0	0.2068
L	0	0.1913
M	0	0.1913
N	0	0.1913
F	0	0.0839
G	0	0.0839

Table 1: Authority and Hub Scores for Network in Figure 1.

71. NEWMAN, *supra* note 41, at 354; s*ee also id.* at 378 (observing that "'communities' are defined to be the natural groupings of vertices in networks," and that "we would like to be able to find them whatever their number").

network, which are listed in Table 1 in descending order of authority score, then hub score.

We can also modify the network map to depict the authority scores. Gephi permits one to vary node and text size according to a metric associated with the nodes. Thus, I can change the map so that both node size and node label vary in direct proportion to a node's authority score. Important nodes stand out more. The revised map is in Figure 3. (One could, alternatively, create a map with nodes that vary with hub score.)

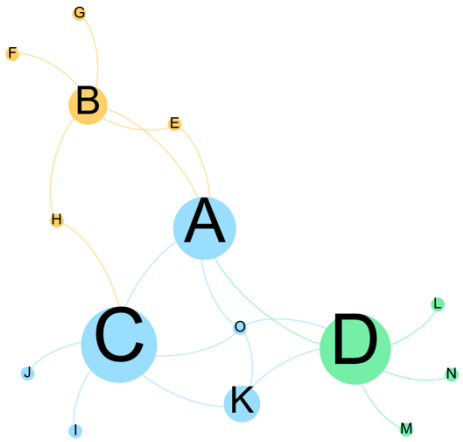


Figure 3

With this illustration as a backdrop, it is time to put the Supreme Court's recent IP decisions in the context of a longer time span. The root data here are citations *from* Supreme Court IP cases decided after argument, *to* other Supreme Court cases of any doctrinal type. The overall set has source cases decided between 1947 and 2017, inclusive.[72] There are also two subsets covering 35 years, 1947 to 1981 and 1982 to 2017. One can generate, for each of these three edge lists, a rank-ordered list of cases/nodes by authority score, as well as a map to visualize the network. Comparing these three views, one can see how much the 1982–2017 citation network changed the 1947–1981 citation network to yield the 1947–2017 citation network.

In gathering the citation data, I defined the category "IP cases" broadly. It includes not only cases decided under the Patent Act, Copyright Act, and Lanham Act, but also cases that turn in a material way on the scope of IP rights—cases such *FTC v. Actavis, Inc.*,[73] an antitrust case about whether a type of patent-litigation-settlement agreement can trigger Sherman Act liability; and *Zacchini*, the right-of-publicity case discussed earlier.[74] I identified the cases using computer searches (in the Westlaw database) of the Court's decisions during the relevant time period, with search terms such as

72. The full edge list, for the 1947–2017 cases, is available as an Excel file on this Journal's Scholarly Commons website. The URL is https://scholarship.kentlaw.iit.edu/ckjip/vol17/iss2/1/.

73. 570 U.S. 136 (2013).

74. *See supra* notes 51–55 and accompanying text. The right of publicity is conventionally understood to be an intellectual-property right. *See*, *e.g.*, J. THOMAS MCCARTHY, TRADEMARKS AND UNFAIR COMPETITION § 28:8 (5th ed.) ("The law of the right of publicity bears some resemblance to the law of trademarks and service marks. Both areas are 'intellectual property' and are properly placed within that family of laws dubbed 'unfair competition.'") (footnote omitted).

"Patent Act," "Copyright Act," "Lanham Act," and "(licens! or infring! or valid! or invalid!) /s (patent or copyright or trademark)." I also relied on my familiarity with the cases from teaching them in IP courses or antitrust courses (which I have done continuously, in one form or fashion, since 2001), as well as lists of Supreme Court IP cases maintained by others that are readily available through internet search.

I compiled the list of citations to target cases from the source IP cases by reading the opinion(s) in the case and recording each Supreme Court case cited one or more times therein. A case cited five times gets one entry on the edge list, just as a case cited once does; put differently, the study does *not* measure citation intensity *within* source cases. Importantly, for each source IP case, I included in its list of target citations *all* the cited cases, no matter where those cited cases first appeared—in a majority opinion, a concurrence, or a dissent. All the opinions in a case, together, embody the full Supreme Court's encounter with a case and present the full Court's stated explanation for its disposition of the case. Each citation is the authoring justice's freely chosen indication that the cited case is an influence in what that justice views as the proper publicly stated ground for the prudent disposition of the case.[75] That citing act, publicly stated, makes the citation linkage a thread in the fabric of the law. For the same reason, I included all the relevant target citations without respect to the stated reason, if any, for the citation, or the degree to which the source case expressly analyzed or distinguished the target case.[76]

In the citation network compiled from Supreme Court IP cases from 1947 to 2017, there are 1,610 nodes and 2,867 edges. Of those case nodes, 181 have an out degree of 1 or more, *i.e.*, are source cases. The network compiled from the 1947–1981 subset has 658 nodes and 1,204 edges, with 81 source cases (*i.e.*, cases with an out degree of 1 or more). The network compiled from the 1982–2017 subset has 1,145 nodes and 1,663 edges, with 100 source cases.

Beginning with the 1982–2017 network, which includes the present period of increased Supreme Court attention to patent law, the median authority

75. *See* Richard A. Posner, *An Economic Analysis of the Use of Citations in the Law*, 2 AM. L. & ECON. REV. 381, 386 (2000) ("It can signify an acknowledgment of priority or influence, a useful source of information, a focus of disagreement, an acknowledgment of controlling authority, or the prestige of the cited work or its author. All of these are forms of influence, in a broad sense, and that may be enough to justify lumping them together for purposes of citations studies concerned with measuring influence.").

76. *See* William M. Landes et al., *Judicial Influence: A Citation Analysis of Federal Courts of Appeals Judges*, 27 J. LEGAL STUD. 271, 273 (1998) ("We have not distinguished between favorable, critical, or distinguishing citations. It is not clear that we should. Critical citations . . . are also a gauge of influence since it is easier to ignore an unimportant decision than to spell out reasons for not following it.").

score among all 1,145 case nodes in this subset is 0.0056. The top 30 authority scores range from 0.2535 to 0.0928. Those top 30 cases and their authority scores are provided in Table 2. Most are IP cases, and 12 were decided in 1980 or later.

In the 1947–1981 network, the median authority score among all 658 case nodes is 0.0042. The top 30 authority scores range from 0.2736 to 0.0907. Those top 30 cases and their authority scores are provided in Table 3. Many are antitrust cases, and none were decided after 1950 (though 19 were decided in the 1940s). This is, in other words, quite a different top-30-authorities list from that of the 1982–2017 network. Indeed, there are only two cases common to both lists: *Motion Picture Patents Co. v. Universal Film Mfg. Co.*,[77] ranked #15 in the 1982–2017 network and #11 in the 1947–1981 network; and *United States v. Paramount Pictures, Inc.*,[78] ranked #22 in the 1982–2017 network and #27 in the 1947–1981 network.

We can see this difference in visualization maps of these two networks. I generated maps for each network and, using the community detection algorithm, applied a common color palette to both (in descending order of community size, measured in number of constituent nodes). I filtered the nodes to remove all but the top 100 nodes by authority score, then applied the force-mapping algorithm to that top-100 group (setting node and label size to vary directly with authority score). The top-100 map for the 1982–2017 network (containing 102, or 8.9%, of 1,145 nodes) is in Figure 4, and the top-100 map for the 1947–1981 network (containing 100, or 15.2%, of 658 nodes) is in Figure 5. They bear little resemblance to one another.

77. 243 U.S. 502 (1917).
78. 334 U.S. 131 (1948).

Case Node	Authority Score
Bonito Boats v. Thunder Craft Boats (1989)	0.2535
Graham v. John Deere Co. (1966)	0.2027
Sony Corp. v. Universal City Studios, Inc. (1984)	0.1918
Twentieth Century Music v. Aiken (1975)	0.1792
Grant v. Raymond (1832)	0.1651
Pfaff v. Wells Elecs. (1998)	0.1646
Kewanee Oil v. Bicron (1974)	0.1634
Mazer v. Stein (1954)	0.1619
Harper & Row, Publ'rs v. Nation Enters. (1985)	0.1517
The Trade-Mark Cases (1879)	0.1461
Fox Film v. Doyal (1932)	0.1460
Pennock v. Dialogue (1829)	0.1365
Wheaton v. Peters (1834)	0.1281
J.E.M. Ag Supply v. Pioneer Hi-Bred Int'l (2001)	0.1267
Motion Picture Patents v. Universal Film Mfg. (1917)	0.1256
Sears, Roebuck & Co. v. Stiffel (1964)	0.1227
Burrow-Giles Lithographic Co. v. Sarony (1884)	0.1213
Marbury v. Madison (1803)	0.1199
Kellogg Co. v. Nat'l Biscuit Co. (1938)	0.1193
New York Trust Co. v. Eisner† (1921)	0.1186
Brenner v. Manson (1966)	0.1136
United States v. Paramount Pictures, Inc. (1948)	0.1097
Feist Publ'ns, Inc. v. Rural Tel. Serv. Co. (1991)	0.1075
Markman v. Westview Instruments, Inc. (1996)	0.1027
City of Boerne v. Flores (1997)	0.0962
Cmty. for Creative Non-Violence v. Reid (1989)	0.0959
Stewart v. Abend (1990)	0.0957
Diamond v. Chakrabarty (1980)	0.0955
McClurg v. Kingsland (1843)	0.0928
Turner Broad. Sys., Inc. v. FCC (1994)	0.0928

Table 2: Top 30 Cases in the 1982–2017 Network, in Descending Order by Authority Score

† *Eisner* has been made famous by Justice Holmes' quip, in this challenge to the constitutionality of a federal estate tax, that on some points of law "a page of history is worth a volume of logic." 256 U.S. 345, 349 (1921). As of February 2018, the query "('page of history' /s 'volume of logic) /p Eisner" in Westlaw's SCT database yields 17 cases spanning seven decades.

Case Node	Authority Score
Mercoid Corp. v. Mid-Continent Inv. Co. (1944)	0.2736
Ethyl Gasoline Corp. v. United States (1940)	0.2350
Int'l Salt Co. v. United States (1947)	0.2199
Morton Salt Co. v. G.S. Suppiger Co. (1942)	0.2140
Sola Elec. Co. v. Jefferson Elec. Co. (1942)	0.2051
United States v. Masonite Corp. (1942)	0.1872
Hartford-Empire Co. v. United States (1945)	0.1830
Edward Katzinger Co. v. Chicago Metallic Mfg. (1947)	0.1813
Carbice Corp. v. Am. Patents Dev. Corp. (1931)	0.1798
United States v. Nat'l Lead Co. (1947)	0.1626
Motion Picture Patents v. Universal Film Mfg. (1917)	0.1550
United States v. Socony-Vacuum Oil Co. (1940)	0.1472
United States v. Univis Lens Co. (1942)	0.1416
MacGregor v. Westinghouse Elec. & Mfg. Co. (1947)	0.1409
United States v. United States Gypsum Co. (1948)	0.1325
Mercoid v. Minneapolis-Honeywell Regulator Co. (1944)	0.1276
IBM v. United States (1936)	0.1243
Scott Paper Co. v. Marcalus Mfg. Co. (1945)	0.1230
Standard Oil of New Jersey v. United States (1911)	0.1160
B.B. Chem. Co. v. Ellis (1942)	0.1131
United Shoe Mach. Corp. v. United States (1922)	0.1116
Transparent-Wrap Mach. Corp. v. Stokes & Smith Co. (1947)	0.1103
United States v. General Elec. Co. (1926)	0.1087
United States v. Line Material Co. (1948)	0.1056
Bement v. Nat'l Harrow Co. (1902)	0.1049
Kendall v. Winsor (1859)	0.0976
United States v. Paramount Pictures, Inc. (1948)	0.0973
Pope v. Gormully (1892)	0.0942
United States v. Am. Tobacco Co. (1911)	0.0912
Interstate Circuit, Inc. v. United States (1939)	0.0907

Table 3: Top 30 Cases in the 1947–1981 Network, in Descending Order by Authority Score

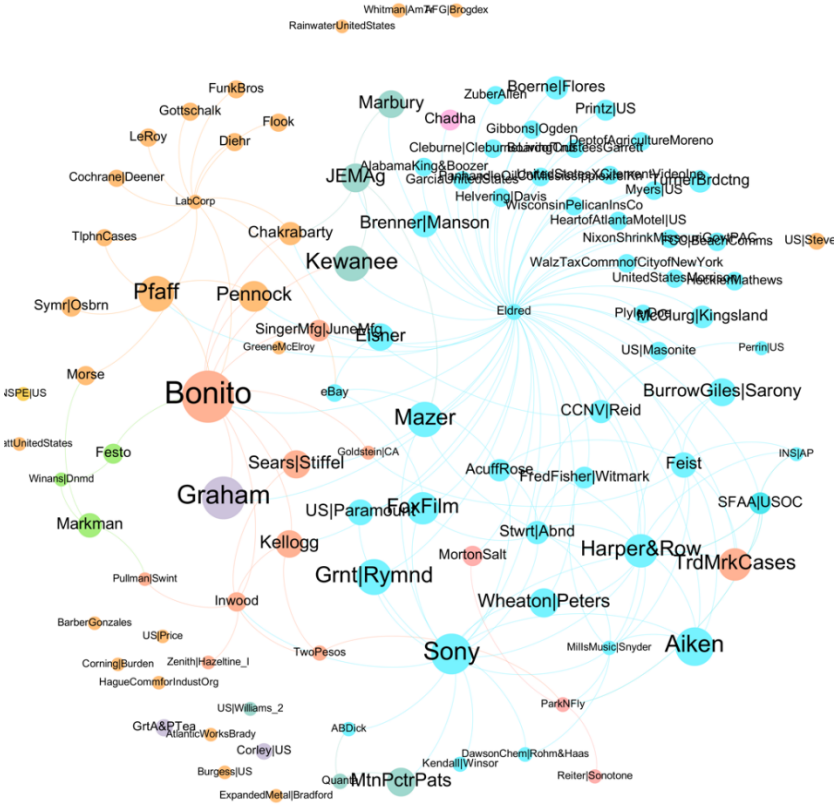


Figure 4: Top 100 Cases, by Authority Score, in the 1982–2017 Network

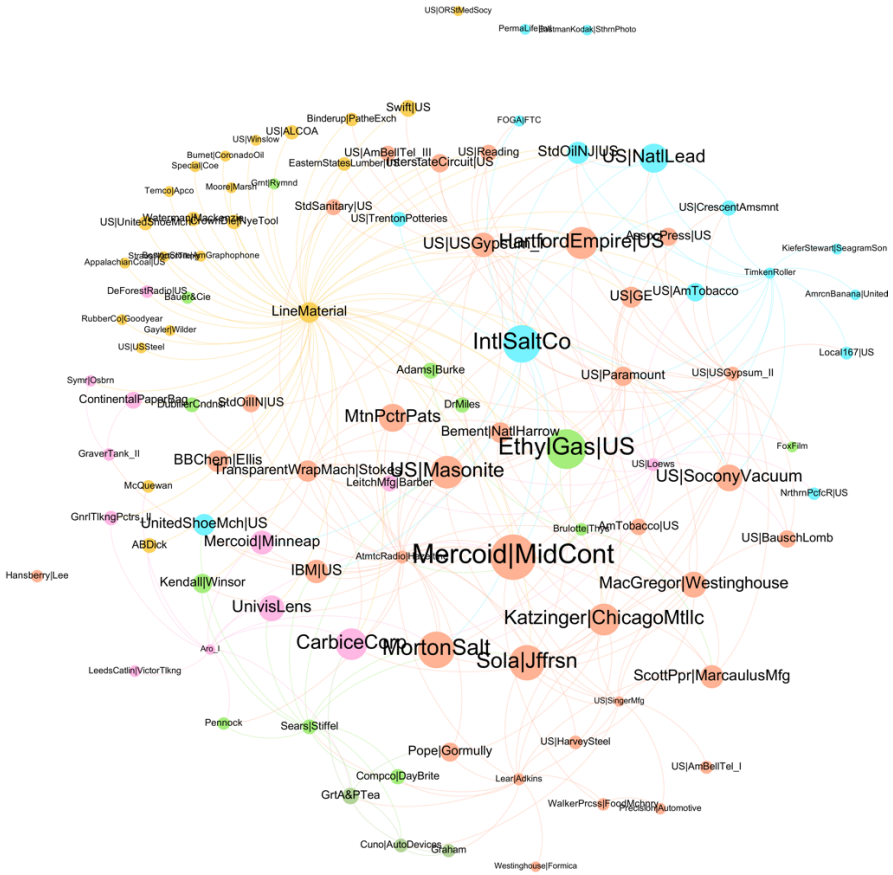


Figure 5: Top 100 Cases, by Authority Score, in the 1947–1981 Network

Now consider the full 1947–2017 network. The median authority score among all 1,610 case nodes is 0.0014. The top 30 authority scores range from 0.2657 to 0.924. Those top 30 cases and their authority scores are provided in Table 4. This list has a large degree of overlap with the top-30 list for the 1947–1981 network, notwithstanding the addition of all the citation data from the 1982–2017. Indeed, there are 26 cases in the top 30 authority scores of both the 1947–1981 and 1947–2017 networks, though many are in different ordinal positions. The only four cases in the top 30 of the 1947–2017 network, that do not also appear in the 1947–1981 network's top 30, are *Graham v. John Deere Co.*[79] (#23 in Table 4, and #2 in Table 2 (the 1982-2017

79. 383 U.S. 1 (1966).

network)); *Henry v. A.B. Dick Co.*[80] (#26 in Table 4); *Sears, Roebuck & Co. v. Stiffel*[81] (#28 in Table 4, and #16 in Table 2); and *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*[82] (#30 in Table 4). This great overlap cannot be dismissed on the ground that older cases, having been available longer, simply garnered more inward citations. If that were the case, the correlation between a case's authority score and decisional year would be strongly negative—higher authority scores would pair to earlier (smaller) calendar-year values. That is not true here. The Pearson's *r* between authority score and decisional year for the top 50 cases in the 1947–2017 network is 0.295. (In the 1947–1981 network, this *r* is 0.306, and in the 1982–2017 network this *r* is -0.043.)

By like token, the map of the 1947–2017 network's top 100 authority-score nodes much more closely resembles the map for the 1947–1981 top 100 than it does the map for the 1982–2017 top 100. (Again, I applied the same color palette to all three maps, in descending order of community size measured in number of constituent nodes.) The map for the 1947–2017 network—containing 100, or 6.2%, of 1,1610 nodes—is in Figure 6. The 1982–2017, in isolation, looks sharply different.[83] The citations that join the map as the years progress from 1982 to 2017 are woven into an already dense set of citations. In the context of a full sweep from 1947 to 2017, current citations bring gradual change.

80. 224 U.S. 1 (1912).

81. 376 U.S. 225 (1964).

82. 340 U.S. 147 (1950).

83. This disparate appearance is not a quirk of the 1982–2017 map. If one were to take, for example, different 20-year segments of citation data, with no overlapping years, the resulting maps would differ. Appendix B, *infra*, provides a pair of maps that, in their contrast to one another, illustrate the point.

Case Node	Authority Score
Mercoid Corp. v. Mid-Continent Inv. Co. (1944)	0.2657
Morton Salt Co. v. G.S. Suppiger Co. (1942)	0.2175
Ethyl Gasoline Corp. v. United States (1940)	0.2149
Int'l Salt Co. v. United States (1947)	0.2072
Motion Picture Patents v. Universal Film Mfg. (1917)	0.2026
Carbice Corp. v. Am. Patents Dev. Corp. (1931)	0.1849
Sola Elec. Co. v. Jefferson Elec. Co. (1942)	0.1803
United States v. Masonite Corp. (1942)	0.1784
Edward Katzinger Co. v. Chicago Metallic Mfg. (1947)	0.1635
Hartford-Empire Co. v. United States (1945)	0.1574
United States v. Univis Lens Co. (1942)	0.1500
United States v. National Lead Co. (1947)	0.1356
United States v. Paramount Pictures, Inc. (1948)	0.1280
United States v. Socony-Vacuum Oil Co. (1940)	0.1255
IBM v. United States (1936)	0.1237
MacGregor v. Westinghouse Elec. & Mfg. Co. (1947)	0.1216
United States v. United States Gypsum Co. (1948)	0.1214
Mercoid v. Minneapolis-Honeywell Regulator Co. (1944)	0.1155
Scott Paper Co. v. Marcalus Mfg. Co. (1945)	0.1142
Kendall v. Winsor (1859)	0.1110
United States v. General Elec. Co. (1926)	0.1072
United Shoe Mach. Corp. v. United States (1922)	0.1049
Graham v. John Deere Co. (1966)	0.1036
Standard Oil of New Jersey v. United States (1911)	0.1011
B.B. Chem. Co. v. Ellis (1942)	0.1005
Henry v. A.B. Dick Co. (1912)	0.0997
Transparent-Wrap Mach. Corp. v. Stokes & Smith Co. (1947)	0.0985
Sears, Roebuck & Co. v. Stiffel (1964)	0.0984
United States v. Line Material Co. (1948)	0.0941
Great Atl. & Pac. Tea Co. v. Supermarket Equip. Corp. (1950)	0.0924

Table 4: Top 30 Cases in the 1947–2017 Network, in Descending Order by Authority Score

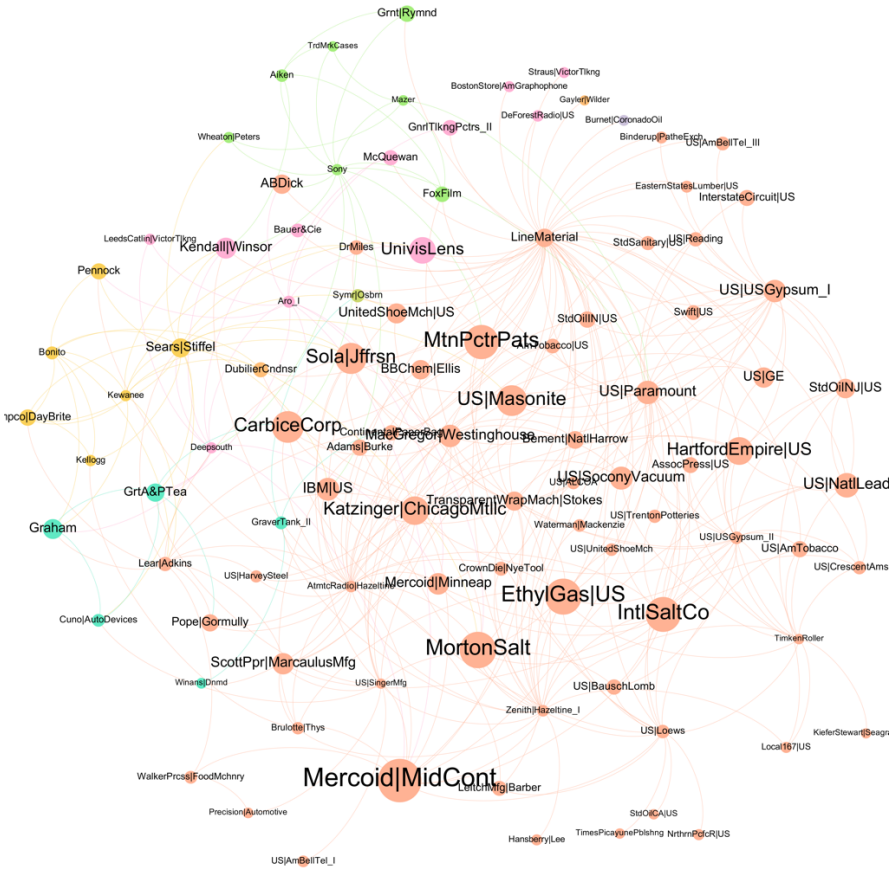


Figure 6: Top 100 Cases, by Authority Score, in the 1947–2017 Network

To close, Mr. Waxman is surely right to caution that the Court should avoid approaching patent law in a way that "'disrupt[s] the settled expectations of the inventing community.'"[84] Those expectations, in turn, are a function of the different perspectives from which observers take stock of the pace and scale of change in the Court's decisions. Put in the larger context of the case-law influences that the Court itself inscribes in its patent law and other IP decisions, which network analysis allows us systematically to assess, the changes of the last 35 years have been neither so fast nor so large as to tear a gap in the larger web of IP law.

84. Waxman, *supra* note 2, at 225 (quoting Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 739 (2002)).

APPENDIX A

Below is a list of the Supreme Court's decisions in copyright (C), patent (P), and trademark (T) cases from its October 1994 Term through its October 2016 Term, inclusive. The list states, for each case, the number of votes for the majority outcome, as well as any concurrences in or dissents from that outcome. Cases are listed in reverse chronological order, by type (C, P, or T).

Name	Vol	Rprtr	Page	Mjrty	Cncr	Dssnt	Type
Star Athletica, LLC v. Varsity Brands, Inc.	137	S. Ct.	1002	5	1	2	C
Kirtsaeng v. John Wiley & Sons, Inc.	136	S. Ct.	1979	8	0	0	C
ABC, Inc. v. Aereo, Inc.	134	S. Ct.	2498	6	0	3	C
Petrella v. MGM, Inc.	134	S. Ct.	1962	6	0	3	C
Kirtsaeng v. John Wiley & Sons, Inc.	568	U.S.	519	6	2	3	C
Golan v. Holder	565	U.S.	302	6	0	2	C
Reed Elsevier, Inc. v. Muchnick	559	U.S.	154	5	3	0	C
MGM Studios Inc. v. Grokster, Ltd.	545	U.S.	913	9	3|3	0	C
Eldred v. Ashcroft	537	U.S.	186	7	0	2	C
New York Times Co. v. Tasini	533	U.S.	483	7	0	2	C
Feltner v. Columbia Pictures Television, Inc.	523	U.S.	340	8	1	0	C
Quality King Distribs. v. L'Anza Res. Int'l	523	U.S.	135	9	1	0	C
Sandoz Inc. v. Amgen Inc.	137	S. Ct.	1664	9	1	0	P
Impression Prods., Inc. v. Lexmark Int'l, Inc.	137	S. Ct.	1523	7	1	1	P
TC Heartland LLC v. Kraft Foods Group Brands LLC	137	S. Ct.	1514	8	0	0	P
SCA Hygiene Prods. v. First Quality Baby Prods.	137	S. Ct.	954	7	0	1	P
Life Techs. Corp. v. Promega Corp.	137	S. Ct.	734	5	2	0	P

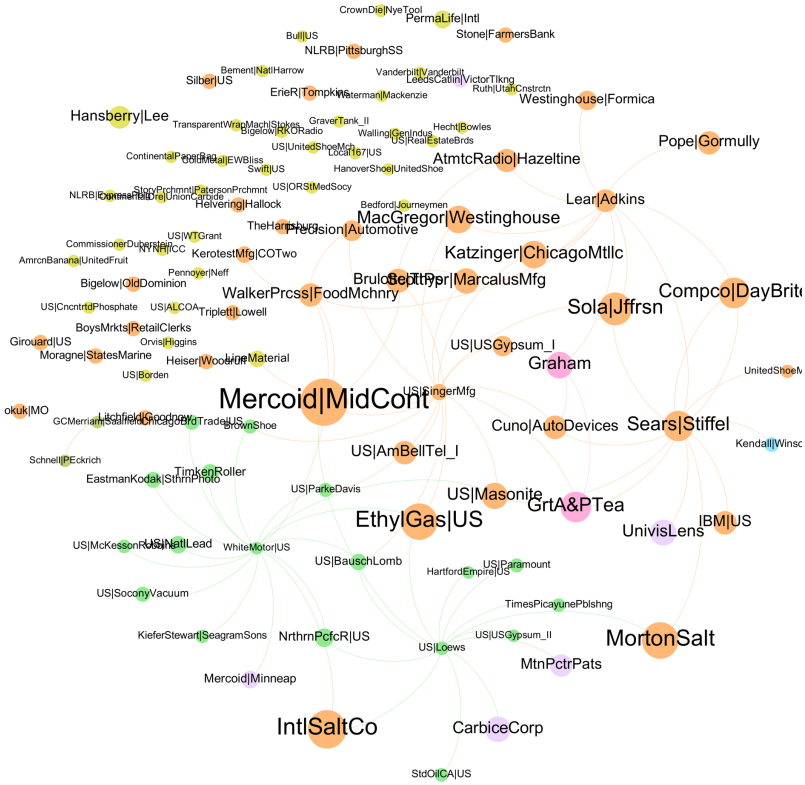
Samsung Elecs. Co. v. Apple Inc.	137	S. Ct.	429	8	0	0	P
Cuozzo Speed Techs. v. Lee	136	S. Ct.	2131	7	1	2	P
Halo Elecs., Inc. v. Pulse Elecs., Inc.	136	S. Ct.	1923	9	3	0	P
Kimble v. Marvel Ent., LLC	135	S. Ct.	2401	6	0	3	P
Commil USA, LLC v. Cisco Sys., Inc.	135	S. Ct.	1920	6	0	2	P
Teva Pharms. USA, Inc. v. Sandoz, Inc.	135	S. Ct.	831	7	0	2	P
Alice Corp. v. CLS Bank Int'l	134	S. Ct.	2347	9	3	0	P
Nautilus, Inc. v. Biosig Instruments, Inc.	134	S. Ct.	2120	9	0	0	P
Limelight Networks, Inc. v. Akamai Techs., Inc.	134	S. Ct.	2111	9	0	0	P
Octane Fitness, LLC v. ICON Health Fitness, Inc.	134	S. Ct.	1749	9	0	0	P
Highmark Inc. v. Allcare Health Mgmt. Sys.	134	S. Ct.	1744	9	0	0	P
Medtronic, Inc. v. Mirowski Family Ventures, LLC	134	S. Ct.	843	9	0	0	P
Ass'n Molecular Pathology v. Myriad Genetics, Inc.	133	S. Ct.	2107	9	1	0	P
Bowman v. Monsanto Co.	133	S. Ct.	1761	9	0	0	P
Gunn v. Minton	568	U.S.	251	9	0	0	P
Kappos v. Hyatt	566	U.S.	431	9	2	0	P
Caraco Pharma. Labs. v. Novo Nordisk	566	U.S.	399	9	1	0	P
Mayo Collaborative Servs. v. Prometheus Labs.	566	U.S.	66	9	0	0	P
Microsoft Corp. v. i4i Ltd.	564	U.S.	91	7	3|1	0	P
Stanford Univ. v. Roche Molecular Sys.	563	U.S.	776	7	1	2	P

Global-Tech Appliances, Inc. v. SEB S.A.	563	U.S.	754	8	0	1	P
Bilski v. Kappos	561	U.S.	593	9	4	0	P
Carlsbad Tech., Inc. v. HIF Bio, Inc.*	556	U.S.	635	9	1|1|2	0	P
Quanta Computer, Inc. v. LG Elecs., Inc.	553	U.S.	617	9	0	0	P
Microsoft Corp. v. AT&T	550	U.S.	437	7	3	1	P
KSR Int'l Co. v. Teleflex Inc.	550	U.S.	398	9	0	0	P
MedImmune, Inc. v. Genentech, Inc.	549	U.S.	118	8	0	1	P
Lab. Corp. v. Metabolite Labs.*	548	U.S.	124	5	0	3	P
eBay Inc. v. MercExchange, LLC	547	U.S.	388	9	3|4	0	P
Unitherm Food Sys. v. Swift-Eckrich, Inc.*	546	U.S.	394	7	0	2	P
Merck KGaA v. Integra Lifesciences I, Ltd.	545	U.S.	193	9	0	0	P
Holmes Group, Inc. v. Vornado Air Circulation Sys.	535	U.S.	826	6	3	0	P
Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.	535	U.S.	722	9	0	0	P
J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l	534	U.S.	124	6	1	2	P
Nelson v. Adams USA, Inc.	529	U.S.	460	9	0	0	P
Florida Prepaid Postsecondary Edu. Exp. Bd. v. Coll. Sav. Bank	527	U.S.	627	5	0	4	P
Dickinson v. Zurko	527	U.S.	150	6	0	3	P
Pfaff v. Wells Elecs.	525	U.S.	55	9	0	0	P
Warner-Jenkinson Co. v. Hilton Davis Chem.	520	U.S.	17	9	2	0	P

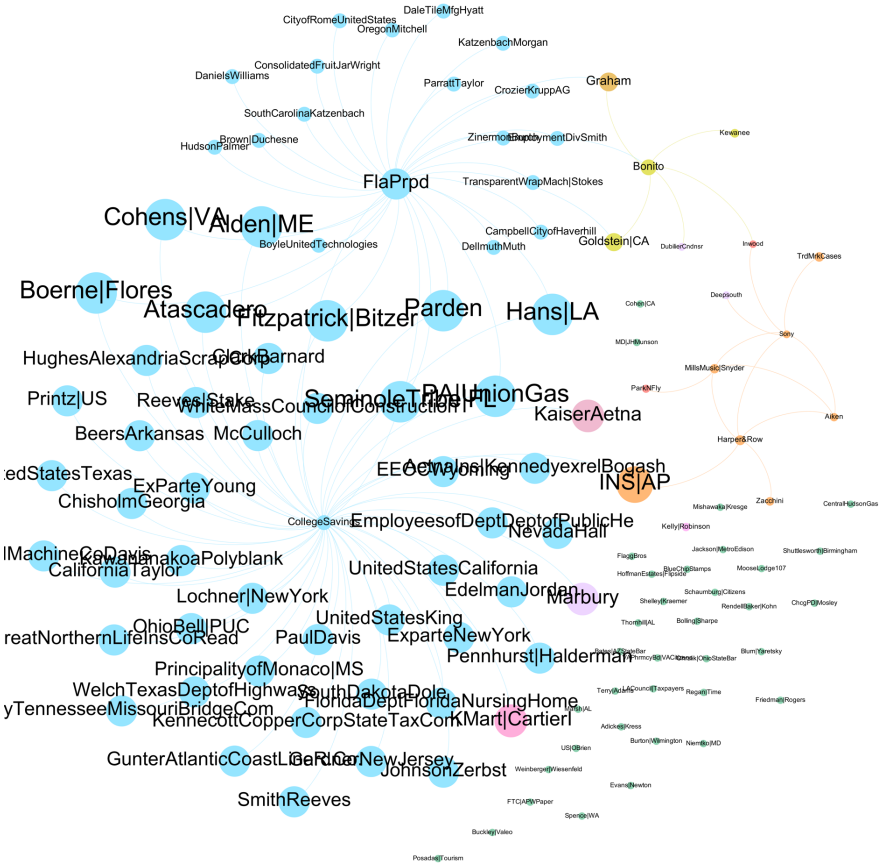
Markman v. Westview Instruments, Inc.	517	U.S.	370	9	0	0	P
Ill. Tool Works v. Indep. Ink	547	U.S.	28	8	0	0	P
Asgrow Seed Co. v. Winterboer*	513	U.S.	179	8	0	1	P
Matal v. Tam	137	S. Ct.	1744	8	4	0	T
B&B Hardware, Inc. v. Hargis Indus., Inc.	135	S. Ct.	1293	7	1	2	T
Hana Fin., Inc. v. Hana Bank	135	S. Ct.	907	9	0	0	T
POM Wonderful LLC v. Coca-Cola Co.	134	S. Ct.	2228	8	0	0	T
Lexmark Int'l v. Static Control Components, Inc.	134	S. Ct.	1377	9	0	0	T
Already, LLC v. Nike, Inc.	568	U.S.	85	9	4	0	T
KP Permanent Make-Up, Inc. v. Lasting Impression I, Inc.	543	U.S.	111	9	0	0	T
Dastar Corp. v. Twentieth Century Fox Film Corp.	539	U.S.	23	8	0	0	T
Moseley v. V Secret Catalogue, Inc.	537	U.S.	418	9	1	0	T
Cooper Indus. v. Leatherman Tool Grp.	532	U.S.	424	7	1|1	1	T
TrafFix Devices, Inc. v. Marketing Displays, Inc.	532	U.S.	23	9	0	0	T
Wal-Mart Stores v. Samara Bros., Inc.	529	U.S.	205	9	0	0	T
Coll. Sav. Bank v. Florida Prepaid Postsecondary Edu. Exp. Bd.	527	U.S.	666	5	0	4	T
Qualitex Co. v. Jacobson Prods.	514	U.S.	159	9	0	0	T
*** These cases are not included in footnote 8 of the Waxman article.**							

APPENDIX B

Below are two citation maps using the citations from subsets of the 1947–2017 data. Each map covers a 20-year period and shows the cases with the top 100 authority scores for that period. The first covers 1960 to 1979, the second covers 1980 to 1999.



Appendix B 1: Top 100 Authority Scores, 1960–1979



Appendix B 2: Top 100 Authority Scores, 1980–1999