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TWO CENTURIES OF TRADEMARK AND COPYRIGHT LAW: A CITATION-NETWORK-ANALYSIS APPROACH

JOSEPH SCOTT MILLER*

The Supreme Court has decided many more patent cases than trademark or copyright cases. This is so not just in the past decade—the focus of the tenth annual Supreme Court IP Review at the Chicago-Kent College of Law, in September 2019—but in the past 20 decades. In gathering the entire body of the Court’s IP caselaw for study with citation-network-analysis tools, I found that patent cases greatly outnumber trademark and copyright cases. Moreover, patent cases, especially patent and antitrust cases, dominate the metrics for the most central cases in the citation network.

One can, however, take the Court’s trademark and copyright cases out of the shadow of the patent cases, creating a citation network focused on those areas of IP law. This paper does so. Specifically, I focus on citation networks embedded in all the Supreme Court trademark and copyright cases that cite out to one or more prior Supreme Court cases.

* Professor, University of Georgia School of Law. © 2020 Joseph Scott Miller.


2. Miller, Measuring & Mapping, supra note 1 (manuscript at 6–7 & fig.1).

3. Id. (manuscript at 10–31).

4. The Court has decided some cases that are not, strictly speaking, copyright or trademark cases, but that also fall outside the utility-patent rubric. I include them in the networks studied here. There are three design-patent cases that cite one or more prior Supreme Court cases (Smith v. Whitman Saddle Co., 148 U.S. 674 (1893); Dunlap v. Schofield, 152 U.S. 244 (1894); and Samsung Elecs. Co. v. Apple Inc., 137 S. Ct. 429 (2016)). There is also one such right-of-publicity case in the network, Zacchini v. Scripps-Howard Broad. Co., 433 U.S. 562 (1977), and the famed “hot news” misappropriation case, Int’l News Serv. v. Associated Press, 248 U.S. 215 (1918).
in any doctrinal area. These IP cases run from Stevens v. Gladding in 1855 to, most recently, Mission Product Holdings, Inc. v. Tempnology, LLC. A number of famed copyright and trademark cases enter the network only as inward-pointed citation targets, rather than as outward-pointing citation sources, for these cited no earlier Supreme Court case at all. These include the Court’s first copyright case, Wheaton v. Peters; its first trademark case, Canal Co. v. Clark; and its first design patent case, Gorham Co. v. White. Consistent with my approach in the prior studies in this series, I derive and analyze both the citation network and the higher-order co-citation network in the cases, limning the Court’s doctrines from the bottom up. I also take snapshots of the networks’ growth and change over time.

Taken together, these citation and co-citation networks describe an established stock of doctrine, comprising decisional law, in a way that highlights both the cites connecting cases and the relative centrality of specific cases within the larger networks. The Court and the advocates, in the years ahead, will draw on this knowledge stock and, with new decisions, modify it. The networks as they stand today, then, provide an important backdrop for reflecting on the Court’s most recent decade of IP decisions, as well as a map of the foundation of the decades to come.

1. One builds a case-law citation network with cases, from which one extracts citations to earlier cases. To gather cases for the larger study of which this paper is an offshoot, using topic-driven keywords and phrases, I framed the “IP case” category broadly. Searching all the Supreme Court’s merits cases through June 2019, I included cases deciding claims brought under the Patent Act, Copyright Act, and Lanham Act (the federal statute providing trademark and false advertising claims). Using search queries such as “trade secret” and “(licens! or infring! or valid! or invalid!)/s (patent or copyright or trademark),” I also

5. 58 U.S. 447 (1854).
7. 33 U.S. 591 (1834).
8. 80 U.S. 311 (1871).
9. 81 U.S. 511 (1871).
10. See supra note 1.
11. See Richard A. Posner, Economic Analysis of Law 759 (9th ed. 2014) (describing a body of precedent as a valuable “stock of knowledge that yields services over many years to potential disputants in the form of information about legal obligations”).
12. As I have previously described it, “citation-network studies promise, for jurisprudence, what digital humanities scholars describe as a working synthesis of close and distant reading. Providing an otherwise unavailable perspective on a large body of self-citing decisional law at a scale that no amount of close reading of individual cases can produce, network analysis uniquely blends granular detail with synoptic sweep.” Miller, Measuring & Mapping, supra note 1, 2.
swept in cases that, according to the Court's opinion(s), turn on the scope of an IP right or the preemptive effect of a federal IP statute. The network thus includes decisions such as United States v. Paramount Pictures, Inc., an antitrust enforcement case involving the licensing of copyrighted motion pictures for public exhibition; and Goldstein v. California, a case reviewing a state criminal anti-bootlegging statute's viability under the federal copyright laws. For each citation-source case, as I read the case to record its citations out to prior Supreme Court cases, I also assigned a code for the main type of IP right involved. The subset of cases I include in the present study include the copyright, trademark, and design-patent cases, and not the utility patent or the trade secret cases.

The total citation network, through 2019, has 1406 case nodes and 2063 citation edges. A map of the network limited to the cases (nodes) with an in-degree score of 2 or more received citations—there happen to be 300 such nodes—appears on the next page. In this force-directed map, clusters of more closely interconnected cases vary by color, and node size and text size vary by a case's in-degree score. If you treat the map as an analog clock face and draw a chord from the 2 to the 8 positions, trademark law is, roughly speaking, above the chord and copyright law is below it.

We can also break down the total network into subparts, by year of decision. For example, in the main study, I tracked the four-year rolling average of the number of Supreme Court cases in each main IP type. In the rolling average data, both the copyright and trademark averages were zero in 1972. The last year this had happened was 1887. Taking 1972 as a pragmatic break point, then, one can group the cases to derive networks from the 1855 to 1972 cases, the 1973 to 2019 cases, and the overarching 1855 to 2019 cases. The summary statistics for the three networks are as follows:

- **the 1855 to 1972 network** has 712 nodes and 1046 edges, with in-degree scores ranging from 0 to 19 and out-degree scores ranging from 0 to 65, and grouping into 26 more closely interconnected clusters;
- **the 1973 to 2019 network** has 780 nodes and 1017 edges, with in-degree scores ranging from 0 to 13 and out-degree scores ranging from 0 to 57, and grouping into 16 more closely interconnected clusters; and

15. See supra note 4.
16. See Miller, Measuring & Mapping, supra note 1, at 6-7 & fig.1.
• the 1855 to 2019 network, overall, has 1406 nodes and 2063 edges, with in-degree scores ranging from 0 to 22 and out-degree scores ranging from 0 to 65, and grouping into 28 more closely interconnected clusters.

In what follows, I look at each of the two shorter periods, as well as the total period, using citation and co-citation networks. The upshot is as simple as it is clear to see: trademark dominates to 1972, then copyright thereafter.

**Figure 1:** Supreme Court cases with in-degree of 2 or more, 1855-2019 network

2. The 1855-1972 network’s out-citing cases, totaling 132 in all, begin with *Stevens v. Gladding*\textsuperscript{17} and end *Fortnightly Corp. v. United Artists Television, Inc.*\textsuperscript{18} Though these are both copyright cases, trademark law dominates this first time span of cases.

Network-analysis metrics help one to speak more concretely about centrality, or a node’s relative importance within a network. There are,

\textsuperscript{17} 58 U.S. 447 (1854).
\textsuperscript{18} 392 U.S. 390 (1968).
however, multiple conceptions of centrality, with associated measures. Most simply, one can simply count a node’s degree, “the number of edges connected to it.” In a directed network like a judicial citation network, where links run in only one direction (backward in time), a case node’s in-degree—the number of incoming citations an earlier case received from later cases—is an obvious indicator of the case’s importance in the network. Indeed, this “simple centrality measure . . . can be very illuminating.” We will look at in-degree scores here.

At the same time, node degree is a “crude measure” in an important respect: it treats all network connections as equally weighted, and that may not be the case. In fact, the very network under scrutiny may undercut the assumption. Consider the specific 1855-1972 network here. The Court’s first trademark case, Canal Co. v. Clark, has an in-degree of 19 in this network. One of the later cases that cites it, Amoskeag Mfg. Co. v. Trainer, itself has an in-degree of 11 in this network. Another later case that cites Canal Co., International News Serv. v. Associated Press, has an in-degree of only 2 in this network. But, so far as in-degree centrality is concerned, the cites Canal Co. garners from Amoskeag Mfg. and from INS have equal weight.

To assess centrality using more of the information the network itself contains, we should value inward citations according to the centrality of the cases from which the citations originate. More than one such metric is available. In this paper, I use two: eigenvector centrality, and PageRank (familiar from Google’s search algorithm). A node’s eigenvector score is dictated by the centrality scores of the nodes that link to it. As a result, “a node can achieve high [eigenvector] centrality either by

19. Mark Newman, Networks 159 (2d ed. 2018) (“There are many possible definitions of importance and there are correspondingly many centrality measures for networks.”).
20. Id.
21. Id. at 110 (“A directed network . . . is a network in which each edge has a direction, pointing from one node to another.”) (emphasis in original).
22. See id. at 130 (“In a directed network each node has two degrees: the in-degree is the number of ingoing edges connected to a node and the out-degree is the number of outgoing edges.”) (emphasis in original).
23. Id. at 159.
24. Id. (“In effect, [degree centrality] awards a node one ‘centrality point’ for every neighbor it has. But not all neighbors are necessarily equivalent.”).
25. 80 U.S. 311 (1871).
27. 248 U.S. 215 (1918).
28. See Newman, supra note 19, at 159-70 (discussing four such metrics).
29. Id. at 159-60. See also Stephen P. Borgatti et al., Analyzing Social Networks 194-96, 203-05, 337 (2d ed. 2018) (defining eigenvector centrality).
having a lot of neighbors with modest centrality, or by having a few neighbors with high centrality (or both). A node’s PageRank score is likewise a function of the linking nodes’ own centrality scores, but also takes account of the linking nodes’ respective out-degrees. As a result, “nodes that point to many others pass only a small amount of centrality on to each of those others, even if their own centrality is high.” In the context of judicial citation networks, PageRank helpfully “highlights the cases to which a cite-to-cite search technique takes one again and again—the cases to which all roads seem to lead.”

Consider, then, the rank order of the top 15 cases in the 1855-1972 network, using each of these three metrics. The data are in Table 1. Short case names are used for ease of presentation; an appendix presents an alphabetical list of all the cases cited in the tables in this paper, with full case name and citation information. In this table, the cell is highlighted grey if the principal IP right in the case is a trademark or design patent. The upshot is plain: measuring case importance using any of these three common network metrics, trademark cases constitute 10 or more of the top 15. And the same three trademark cases—Canal Co., McLean, and Amoskeag—are in the top five of all three metrics. Put differently, in 1972, the Supreme Court’s IP jurisprudence about rights other than utility-patent rights is, largely, a jurisprudence of trademarks.

31. *Id.* at 165-66 (describing PageRank).
32. *Id.* at 165. There is also a “random walker with teleport” interpretation of PageRank score, the details of which merit consideration in citation network analysis. See Miller, *Measuring & Mapping*, supra note 1, at 9 & ns. 48-49. PageRank requires a tuning parameter, and I use 0.5. *Id.*
34. There is only one of these in the table—namely: Gorham Co. v. White, 81 U.S. (14 Wall.) 511 (1871).
### Table 1: Top 15 cases by centrality metric, 1855-1972 network

<table>
<thead>
<tr>
<th>Rank</th>
<th>In-Degree</th>
<th>Eigenvector</th>
<th>PageRank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Canal Co. v. Clark</td>
<td>Canal Co. v. Clark</td>
<td>Amoskeag v. Trainer</td>
</tr>
<tr>
<td>2</td>
<td>McLean v. Fleming</td>
<td>McLean v. Fleming</td>
<td>McLean v. Fleming</td>
</tr>
<tr>
<td>3</td>
<td>Wheaton v. Peters</td>
<td>Amoskeag v. Trainer</td>
<td>Canal Co. v. Clark</td>
</tr>
<tr>
<td>4</td>
<td>Elgin Watch</td>
<td>Gorham Co. v. White</td>
<td>Gorham Co. v. White</td>
</tr>
<tr>
<td>6</td>
<td>Singer v. June</td>
<td>Goodyear Rubber</td>
<td>Trademark Cases</td>
</tr>
<tr>
<td>7</td>
<td>Trademark Cases</td>
<td>Menendez v. Holt</td>
<td>Singer v. June</td>
</tr>
<tr>
<td>8</td>
<td>American Tobacco</td>
<td>Lawrence Mfg.</td>
<td>Wheaton v. Peters</td>
</tr>
<tr>
<td>13</td>
<td>Goodyear Rubber</td>
<td>Coats v. Merrick</td>
<td>E.C. Atkins v. Moore</td>
</tr>
<tr>
<td>14</td>
<td>Columbia Mill</td>
<td>Banks v. Manchester</td>
<td>Bobbs-Merrill</td>
</tr>
<tr>
<td>15</td>
<td>Howe Scale</td>
<td>Singer v. June</td>
<td>Burrow-Giles Litho.</td>
</tr>
</tbody>
</table>

We can also visualize the 1855-1972 citation network using each of these metrics, creating force-directed maps\(^\text{35}\) of the nodes and links that cluster more closely interlinked cases by color. Node size and text size vary by centrality score, showing higher-scoring cases more prominently.

Starting with in-degree, Figure 2 depicts all the nodes in the network with an in-degree of 2 or more. Though there is a notable copyright cluster on the lower right (in blue) anchored by *Wheaton v. Peters*, the most prominent cluster is the trademark cluster on the upper left (in orange) anchored by *Canal Co. v. Clark*.

\(^{35}\) Force-directed mapping effectively treats the citation links between cases as springs that hold the cases together and treats the case nodes as charged particles that repel each other. The map rests at the point of balance among these forces, given the particular nodes and links involved. See Miller, *Law’s Semantic Self-Portrait,* supra note 1, at 25 n.111.
Figure 2: Supreme Court cases with in-degree of 2 or more, 1855-1972 network

Figure 3, below, depicts the top 100 case nodes by eigenvector score. And Figure 4 depicts the top 100 case nodes by PageRank score. In both figures, the orange trademark-case cluster is prominent. The most central cases in the basic citation network, from 1855 to 1972, are trademark cases.
Figure 3: Top 100 Supreme Court cases by eigenvector score, 1855-1972 network
We can also derive, from the basic citation network, a co-citation network. In such a network, the nodes remain cases, and the edges vary in weight with the number of times two cases appeared together as citations in a later case. 36 One can also assign each case node a weighted degree score, equal to the sum of the weights of the links it shares with other co-cited papers, which serves as a centrality measure for rank-ordering cases. 37 Figure 5 shows the top 105 cases, 38 by weighted degree score, in the 1855-1972 co-citation network. Once again, one cannot mistake the prominence of the trademark-law cluster anchored by

36. See Newman, supra note 19, at 39 ("Two papers are said to be cocited if they are both cited by the same third paper. Cocitation is often taken as an indicator that papers deal with related topics and there is good evidence that this is a reasonable assumption in many cases ... One can also define a weighted cocitation network in which the edges have varying strengths: the strength of an edge between two papers is equal to the number of other papers that cite both."). Unlike Newman, who writes "cocitation" without a hyphen, I find it much easier to read with a hyphen. On the importance of co-citation analysis as a new way to assess doctrinal change in decisional law, with applications to citation data, see Miller, Law's Semantic Self-Portrait, supra note 1, at 7-17, 45-56.

37. See Miller, Law's Semantic Self-Portrait, supra note 1, at 35, n.165.

38. It is 105, rather than 100, to capture at least 100 case nodes in the figure. The next step down in weighted degree score brought the map below the 100-case threshold.
Canal Co., in orange. Indeed, the top eight cases, by weighted degree, are all in the trademark cluster.

**Figure 5:** Top 105 Supreme Court cases by weighted degree score, 1855-1972 co-citation network

3. The 1973-2019 network’s out-citing cases, totaling 54 in all, begin with *Goldstein v. California* and end with *Mission Prod. Holdings, Inc. v. Tempnology, LLC*. In contrast to the 1855-1972 period, copyright cases dominate this more recent period.

Begin, then, with the rank order of the top 15 cases in the 1973-2019 network, using each of the three centrality metrics for citation networks, set out above. The data are in Table 2. In this table, by contrast with Table 1, the cell is highlighted grey if the principal IP right in the case is a copyright (not a trademark). Copyright cases dominate this group, to nearly the same degree as trademark cases dominated the

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40. 139 S. Ct. 1652 (2019).
earlier group: For all three metrics, eight or more of the top 15 cases are copyright cases.

**Table 2**: Top 15 cases by centrality metric, 1973-2019 network

<table>
<thead>
<tr>
<th>Rank</th>
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<th>Eigenvector</th>
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<tbody>
<tr>
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<td>Sony v. Universal</td>
<td>Fox Film v. Doyal</td>
<td>Sony v. Universal</td>
</tr>
<tr>
<td>2</td>
<td>20th Cntry v. Aiken</td>
<td>Kendall v. Winsor</td>
<td>Inwood v. Ives</td>
</tr>
<tr>
<td>3</td>
<td>Trademark Cases</td>
<td>Trademark Cases</td>
<td>Two Pesos</td>
</tr>
<tr>
<td>5</td>
<td>Fox Film v. Doyal</td>
<td>Fortnightly v. UA</td>
<td>Qualitex v. Jacobson</td>
</tr>
<tr>
<td>6</td>
<td>Mazer v. Stein</td>
<td>Buck v. Jewell-LaSalle</td>
<td>20th Cntry v. Aiken</td>
</tr>
<tr>
<td>7</td>
<td>Park’N Fly</td>
<td>Mazer v. Stein</td>
<td>Fox Film v. Doyal</td>
</tr>
<tr>
<td>8</td>
<td>Mills Music</td>
<td>Burrow-Giles Litho.</td>
<td>Harper &amp; Row</td>
</tr>
<tr>
<td>9</td>
<td>Burrow-Giles Litho.</td>
<td>Grant v. Raymond</td>
<td>Park’N Fly</td>
</tr>
<tr>
<td>10</td>
<td>Two Pesos</td>
<td>Teleprompter v. CBS</td>
<td>Kellogg v. NaBisCo</td>
</tr>
<tr>
<td>11</td>
<td>Inwood v. Ives</td>
<td>Sony v. Universal</td>
<td>Mazer v. Stein</td>
</tr>
<tr>
<td>12</td>
<td>Eldred v. Ashcroft</td>
<td>U.S. v. Paramount</td>
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The importance of copyright law for the 1973-2019 cohort is also evidence in the network maps reflecting the same centrality metrics. Figures 6, 7, and 8 show the top cases by in-degree, eigenvector score, and PageRank score, respectively. In addition to the citation network, one can also derive the related co-citation network for the 1973-2019 period. Figure 9 maps all 99 nodes in this second-order network. Of the five distinct clusters in the co-citation network map, four focus on copyright cases. And of the top eight cases by weighted degree, only one, *The Trademark Cases*, is not a copyright case.
**Figure 6:** Supreme Court cases with in-degree of 2 or more, 1973-2019 network

![Supreme Court cases network](image1.png)

**Figure 7:** Top 118 Supreme Court cases by eigenvector score, 1973-2019 network

![Top Supreme Court cases network](image2.png)
Figure 8: Top 100 Supreme Court cases by PageRank score, 1973-2019 network

Figure 9: Top 99 Supreme Court cases by weighted degree score, 1973-2019 co-citation network
4. What is the current state of the network, viewed over the whole 1855-2019 timespan? The greater emphasis on copyright law since 1973 has made its mark on the network's centrality metrics. Table 3 tells the story. In this table, trademark cases are coded orange and copyright cases are coded blue. Comparing the top PageRank scores from the 1855-1972 period (in Table 1) with the top PageRank scores for whole 1855-2019 period, it is notable how little has changed. All 15 PageRank cases are the same, though some have changed ordinal position; indeed, all three copyright cases—*Wheaton*, *Burrow-Giles*, and *Bobbs-Merrill*—have a higher ordinal rank in 2019 than they did in 1972. But four of the top five cases by PageRank remain the same, and all are trademark cases. In judicial case citation networks, PageRank scores really do take us to the foundational cases we encounter again and again.41 In the top cases by eigenvector and in-degree scores, the copyright-heavy activity of the past 47 years is more evident. In the 1855-1972 period, there were only three copyright cases among the top 15 by in-degree score, and there are now eight. Similarly, in the 1855-1972 period, there were only two copyright cases among the top 15 by eigenvector score, and there are now six.

41. *See supra* note 33 and accompanying text.
Table 3: Top 15 cases by centrality metric, 1855-2019 network

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<td>15</td>
<td>Hanover Star Milling</td>
<td>White-Smith Music</td>
<td>E.C. Atkins v. Moore</td>
</tr>
</tbody>
</table>

The network maps also reflect both the significance of the trademark-focused era through 1972 and the turn to copyright from 1973 to now. Figures 10 and 11 show the top cases by eigenvector score and PageRank score, respectively. (Figure 1, above, shows all the cases with an in-degree score of 2 or more). Again, as before, one can also derive the related co-citation network for the 1855-2019 period. Figure 12 maps the top nodes, by weighted degree, in this second-order network. Of four main clusters, one is trademark focused, two are copyright focused, and one is copyright & antitrust.
Figure 10: Top 100 Supreme Court cases by eigenvector score, 1855-2019 network

Figure 11: Top 100 Supreme Court cases by PageRank score, 1855-2019 network
Cases comprise a stock of doctrinal moves, and judges point to prior moves to help explain present ones. That will surely continue. As the Supreme Court wrestles with copyright and trademark cases in the 2019 Term and beyond, the cases containing the networks measured and mapped here are both foundation and backdrop, text and context. In a way, the citation networks are law’s text at its most elemental, making the past visibly present in the tethers that link the two. As Professor White observed in a beautiful meditation a generation ago, a “judicial opinion . . . translates the experience of the parties, and the languages in which they naturally speak of it, into the language of the law, which connects cases across time and space . . . The opinion thus engages in the central conversation that is for us the law, a conversation that the opinion
itself makes possible.” Citation networks are the standing echoes of the conversation that is law, enduring in time.

APPENDIX

Below is a list of all the cases that appear in Tables 1 to 3, in compressed form. In this list, which is arranged alphabetically by lead party name, the full citation information accompanies the case name. The list also includes significant cases named in the co-citation network maps in Figures 5, 9, and 12.

Banks v. Manchester, 128 U.S. 244 (1888).
Canal Co. v. Clark, 80 U.S. (13 Wall.) 311 (1872).
Columbia Mill Co. v. Alcorn, 150 U.S. 460 (1893).
Corbin v. Gould, 133 U.S. 308 (1890).
Fox Film Corp. v. Doyal, 286 U.S. 123 (1932).

Gorham Co. v. White, 81 U.S. 511 (1871).
Grant v. Raymond, 31 U.S. 218 (1832).
The Conqueror, 166 U.S. 110 (1897).
The Trade-Mark Cases, 100 U.S. 82 (1879).
Twentieth Century Music Corp. v. Aiken, 422 U.S. 151 (1975).
United States v. Reese, 92 U.S. 214 (1876).