The Aggregate Harmony Metric and a Statistical and Visual Contextualization of the Rehnquist Court: 50 Years of Data

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I. Introduction

An important anniversary went uncelebrated in the *Harvard Law Review's* most recent review of the previous United States Supreme Court term.[1] The November 2006 issue marked the 50th year that the *Harvard Law Review* published its annual matrix of the inter-agreement amongst all of the justices for a particular term.[2] These matrixes

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[1] *See The Supreme Court, 2005 Term—The Statistics,* 120 HARV. L. REV. 372-384 (2006).

[2] 1956 to 2005 Terms. *See The Supreme Court, 1956 Term- Business of the Court,* 71 HARV. L. REV. 94, 103 (1957); *The Supreme Court, 1957 Term- Business of the Court,* 72 HARV. L. REV. 98, 103 (1958); *The Supreme Court, 1958 Term- Business of the Court,* 73 HARV. L. REV. 128, 133 (1959); *The Supreme Court, 1959 Term- Business of the Court,* 74 HARV. L. REV. 97, 105 (1960); *The Supreme Court, 1960 Term- Business of the Court,* 75 HARV. L. REV. 83, 89 (1961); *The Supreme Court, 1961 Term- Business of the Court,* 76 HARV. L. REV. 78, 85 (1962); *The Supreme Court, 1962 Term- Business of the Court,* 77 HARV. L. REV. 81, 87 (1963); *The Supreme Court, 1963 Term- Business of the Court,* 78 HARV. L. REV. 179, 183 (1964); *The Supreme Court, 1964 Term- Business of the Court,* 79 HARV. L. REV. 105, 109 (1965); *The Supreme Court, 1965 Term- The Statistics,* 80 HARV. L. REV. 141, 145 (1966); *The Supreme Court, 1966 Term- The Statistics,* 81 HARV. L. REV. 126, 131 (1967); *The Supreme Court, 1967 Term- The Statistics,* 82 HARV. L. REV. 301, 307 (1968); *The Supreme Court, 1968 Term- The Statistics,* 83 HARV. L. REV. 277, 279 (1969); *The Supreme Court, 1969 Term- The Statistics,* 84 HARV. L. REV. 247, 252 (1970); *The Supreme Court, 1970 Term- The Statistics,* 85 HARV. L. REV. 344, 351 (1971); *The Supreme Court, 1971 Term- The Statistics,* 86 HARV. L. REV. 297, 301 (1972); *The Supreme Court, 1972 Term- The Statistics,* 87 HARV. L. REV. 303, 304 (1973); *The Supreme Court, 1973 Term- The Statistics,* 88 HARV. L. REV. 274, 275 (1974); *The Supreme Court, 1974 Term- The Statistics,* 89 HARV. L. REV. 275, 276 (1975); *The Supreme Court, 1975 Term- The Statistics,* 90 HARV. L. REV. 276, 277 (1976); *The Supreme Court, 1976 Term- The Statistics,* 91 HARV. L. REV. 295, 296 (1977); *The Supreme Court, 1977 Term- The Statistics,* 92 HARV. L. REV. 327, 328 (1978); *The Supreme Court, 1978 Term- The Statistics,* 93 HARV. L. REV. 275, 276 (1979); *The Supreme Court, 1979 Term- The Statistics,* 94 HARV. L. REV. 289, 290 (1980); *The Supreme Court, 1980 Term- The Statistics,* 95 HARV. L. REV. 339, 340 (1981); *The Supreme Court, 1981 Term- The Statistics,* 96 HARV. L. REV. 304, 305 (1982); *The Supreme Court, 1982 Term- The Statistics,* 97 HARV. L. REV. 295, 296 (1983); *The Supreme Court, 1983 Term- The Statistics,* 98 HARV. L. REV. 307, 308 (1984); *The Supreme Court, 1984 Term- The Statistics,* 99 HARV. L. REV. 322, 323 (1985); *The Supreme Court, 1985 Term- The Statistics,* 100 HARV. L. REV. 304, 305 (1986); *The Supreme Court, 1986 Term- The Statistics,* 101 HARV. L. REV. 362, 363 (1987); *The Supreme Court, 1987 Term-The Statistics,* 102 HARV. L. REV. 350, 351 (1988); *The Supreme Court, 1988 Term- The Statistics,* 103 HARV. L. REV. 394, 395 (1989); *The Supreme Court, 1989 Term- The Statistics,* 104 HARV. L. REV. 359, 360 (1990); *The Supreme Court, 1990 Term- The Statistics,* 105 HARV. L. REV. 419, 420 (1991); *The Supreme Court, 1991 Term- The Statistics,* 106 HARV. L. REV. 378, 379 (1992); *The Supreme Court, 1992 Term- The Statistics,* 107 HARV. L. REV. 372, 373 (1993); *The Supreme Court, 1993 Term- The Statistics,* 108 HARV. L. REV. 372, 373

include both raw numbers and percentages as to how often any two justices sided together on cases for that particular term relative to the amount of cases the two justices heard together.[3] Aggregating this data over the 50 year span allows for some important insights and benchmarks as to the last half century of the Supreme Court—1956 to 2005 terms. Given how often these or similar statistics are cited,[4] emulated,[5] compiled and/or

(1994); *The Supreme Court, 1994 Term- The Statistics,* 109 HARV. L. REV. 340, 341 (1995); *The Supreme Court, 1995 Term- The Statistics,* 110 HARV. L. REV. 367, 368 (1996); *The Supreme Court, 1996 Term- The Statistics,* 111 HARV. L. REV. 431, 432 (1997); *The Supreme Court, 1997 Term- The Statistics,* 112 HARV. L. REV. 366, 367 (1998); *The Supreme Court, 1998 Term- The Statistics,* 113 HARV. L. REV. 400, 401 (1999); *The Supreme Court, 1999 Term-The Statistics,* 114 HARV. L. REV. 390, 391 (2000); *The Supreme Court, 2000 Term- The Statistics,* 115 HARV. L. REV. 539, 540 (2001); *The Supreme Court, 2001 Term- The Statistics,* 116 HARV. L. REV. 453, 454 (2002); *The Supreme Court, 2002 Term- The Statistics,* 117 HARV. L. REV. 480, 481 (2003); *The Supreme Court, 2003 Term- The Statistics,* 118 HARV. L. REV. 497, 499 (2004); *The Supreme Court, 2004 Term- The Statistics,* 119 HARV. L. REV. 420, 421 (2005); *The Supreme Court, 2005 Term—The Statistics,* 120 HARV. L. REV. 372, 374 (2006).

[3] *Id.*.

[4] *See also,* Paul Butler, *Rehnquist, Racism, and Race Jurisprudence*, 74 GEORGE WASHINGTON LAW REV. 1019, 1030 (2006); Stephen J. Wermiel, *Clarence Thomas After Ten Years: Some Reflections,* 10 AM. U. J. GENDER SOC. POL'Y & L. 315, 316 (2002); Kevin H. Smith, *Certiorari and the Supreme Court Agenda: An Empirical Analysis,* 54 OKLA. L. REV. 727, 728 (2001); Michael Stokes Paulsen, *Counting Heads on RFRA,* 14 CONST. COMMENTARY 7, 12 (1997); Walter E. Joyce, *The Early Constitutional Jurisprudence of Justice Stephen G. Bryer: A Study of the Justice's First Year on the United States Supreme Court,* 7 SETON HALL CONST. L. J. 149, 161 (1996); Liang Kan, *A Theory of Justice Souter,* 45 EMORY L. J. 1373, 1399 (1996); Jeffrey B. King, Comment, *Now Turn to the Left: The Changing Ideology of Justice Harry A. Blackmun,* 33 HOUS. L. REV. 277, 287 (1996); Alan I. Bigel, *Justices William J. Brennan, Jr. and Thurgood Marshall on Capital Punishment: Its Constitutionality, Morality, Deterrent Effect, and Interpretation by the Courts,* 8 Notre Dame J. Law, Ethics & Public Policy 11, 25 (1994); Stephen Calkins, *The October 1992 Supreme Court Term and Antitrust: More Objectivity than Ever,* 62 ANTITRUST L. J. 327, 405 (1994); John G. Roberts, Jr., *The 1992-93 Supreme Court,* 1994 PUBLIC INTEREST L. REV. 107 (1994); Alan I. Bigel, *The Rehnquist Court of Right to Life: Forecast for the 1990's,* 18 OHIO NORTHERN L. REV. 515, 525 (1992); William D. Popkin, *A Common Law Lawyer on the Supreme Court: The Opinions of Justice Stevens,* 1989 DUKE L. J. 1087, 1089 (1989); William B. Schultz & Philip K. Howard, *The Myth of Swing Voting: An Analysis of Voting Patterns On the Supreme Court,* 50 N.Y.U. L. REV. 798 (1975).

[5] *See also,* Mark Tushnet, *Taking Sides: Many believe political differences rend the Rehnquist Court. But more than politics are in play*, LEGAL AFFAIRS, Mar.-April 2005, at __, available at http://www.legalaffairs.org/issues/March-April-2005/numbers_marapr05.msp; At least one group of authors has repeatedly applied the Harvard Law Review's format and methodology to the voting patterns of a state Supreme Court (Indiana): Mark J. Crandley ET. AL., *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 2005,* 39 IND. L.REV. 733 (2006); Mark J. Crandley & P. Jason Stephenson, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 2004,* 38 IND. L. REV. 867 (2005); Kevin W. Betz Et. Al., *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 2003,* 37 IND. L. REV. 891 (2004); Kevin W. Betz & P Jason Stephenson, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 2002,* 36 IND. L. REV. 919 (2003); Kevin W. Betz & P Jason Stephenson, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 2001,* 35 IND. L. REV. 1117 (2002); Kevin W. Betz & P Jason Stephenson, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 2000,* 34 IND. L. REV. 541 (2001); Kevin W. Betz & Mark A. Lindsey, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1999,* 33 IND. L. REV. 1109 (2000); Kevin W. Betz & Mark A. Lindsey, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1998,* 32 IND. L. REV. 599 (1999); Kevin W. Betz & Barry L. Loftus, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1997,* 31 IND. L. REV. 457 (1998); Kevin W. Betz & Andrew T. Deibert, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1996,* 30 IND. L. REV. 933 (1997); Kevin W. Betz & Andrew T. Deibert, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1995,* 29 IND. L. REV. 771 (1996); Kevin W. Betz & Andrew T. Deibert, *An*

reproduced,[6] the aggregated, longitudinal data should be of interest to scholars, commentators, law students, and the public at large.

Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1994, 28 IND. L. REV. 853 (1995); Kevin W. Betz & Andrew T. Deibert, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1993,* 27 IND. L. REV. 719 (1994); Kevin W. Betz, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1992,* 26 IND. L. REV. 691 (1993); Kevin W. Betz, *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 1991,* 25 IND. L. REV. 1469 (1992); Others have done a similar analysis as to various state supreme courts: (Alaska) Christine M. Motta, Note, *The Supreme Court of Alaska: Unique and Independent Like the People of the Last Frontier,* 60 ALB. L. REV. 1727, 1752 (1997); (California) Stephen R. Barnett, *The Supreme Court of California, 1981-1982: Foreward: The Emerging Court,* 71 Cal. L. Rev. 1134, 1193 (1983); (Colorado) Nathan J. Kunz ET. AL., Note, *Colorado Supreme Court Statistical Review,* 83 DENV. U. L. REV. 605 (2005); (Florida) Shane R. Heskin, Note, *Florida's State Constitutional Adjudication: A Significant Shift as Three New Members Take Seats on the State's Highest Court?,* 62 ALB. L. REV. 147 (1999); (Illinois) Robert Bradley & S. Sidney Ulmer, *An Examination of Voting Behavior in the Supreme Court of Illinois: 1971-1975,* 5 S. ILL. U. L. J. 245 (1980); (Maryland) Lucy Moran, *Annual Review of Maryland Law: Court of Appeals of Maryland, 1995-96 Opinions,* 26 U. BALT. L. REV. 1 (1996); Rochelle Block & Jeffrey Laynor, Note, *The Work of the Court of Appeals: A Statistical Miscellany: July 1, 1985 through June 30, 1986,* 46 MD. L. REV. 891, 898 (1987)(The first footnote of this work cites previous Maryland studies:

> Reynolds, The Court of Appeals of Maryland: Rules, Work and Performance--Part I, 37 MD. L. REV. 1, 40-60 (1977) (September 1975 Term); The Work of the Court of Appeals: A Statistical Miscellany, 39 MD. L. REV. 646 (1980) (September 1978 Term); 41 MD. L. REV. 554 (1982) (September 1980 Term); 42 MD. L. REV. 610 (1982) (September 1981 Term); 43 MD. L. REV. 863 (1983) (September 1982 Term); 44 MD. L. REV. 715 (1985) (September 1983 Term); 45 MD. L. REV. 1071 (1986) (September 1984 Term). Data from prior years were compiled on a calendar year basis. This version, however, coincides with the decisions reviewed in the Survey of Maryland Law, which results in a six-month overlap with the previous Statistical Miscellany. Unless otherwise noted, figures from these tables may be compared to figures in the earlier tables. Comparable figures for the September 1957 through September 1963 Terms are found in Special Report of the Committee on Judicial Administration of the Maryland State Bar Association, reprinted in 1 Md. App. vii, xxv-xxx (1967)).;

(Massachusetts) Robert A. Marangola, Note, *Independent State Constitutional Adjudication in Massachusetts: 1988-1998,* 61 ALB. L. REV. 1625, 1675 (1998); (New York) Luke Bierman, *The Dynamics of State Constitutional Decision-Making: Judicial Behavior at the New York Court of Appeals,* 68 TEMPLE L. REV. 1403 (1995); Vincent Martin Bonventre, *Court of Appeals—State Constitutional Law Review, 1990,* 12 Pace L. Rev. 1 (1992); (North Carolina) Harry C. Martin, *Statistical Compilation of the Opinions of the Supreme Court of North Carolina Terms 1989-90 through 1992-93,* 72 N. CAR. L. REV. 1453 (1994); (Oregon) Michael West, Note, *Arrested Development: An Analysis of the Oregon Supreme Court's Free Speech Jurisprudence in the Post-Linde Years,* 63 ALB. L. REV. 1237 (2000); (Tennessee) Glynna K. Parde, Note, *Judicial Decision Making: A Statistical Analysis of the Tennessee Supreme Court—1992 Term,* 24 MEM. ST. U. L. REV. 325 (1994); and (Washington) James E. Bond & Kelly Kunsch, *A State Supreme Court in Transition,* 25 SEATTLE U. L. REV. 545 (2002); There is at least one study as to the voting alignment of a particular Federal Court of Appeals: (DC Circuit) Harry T. Edwards, *Public Misperceptions Concerning the "Politics" of Judging: Dispelling Some Myths About the D.C. Circuit,* 56 COL. L. REV. 619, 644 (1985).

[6] *See also,* Linda Greenhouse, *Court in Transition: News Analysis; Consistently, A Pivotal Role* N.Y. TIMES, July 2, 2005, at A1 with the chart titled, "Agreement Among Supreme Court Justices: Percentage of times that justices agreed in non-unanimous cases from the 1994-95 term through the 2003-04 term"; Linda Greenhouse, *Roberts Is at Court's Helm, But He Isn't Yet in Control* N.Y. TIMES, July 2, 2006, at Sec. 1 with the chart titled, "Percentage of times that pairs of justices agreed in nonunanimous decisions in the 2005-6 term;" Paul H. Edelman & Jim Chen, *The Most Dangerous Justice Rides Again: Revisiting the Power Pageant of the Justices,* 86 MINN. L. REV. 131, 190-191 (2001); Paul H. Edelman & Jim Chen, *The*

Furthermore, these aggregated matrixes of agreement allow for interesting visualizations of the Supreme Court, both longitudinally and year by year. Using existing software, measures of agreement (and disagreement) allow for the justices to be distributed spatially as to their ideological sympathies. Such spatial visualizations quickly convey to the viewer which justices are often in agreement, which are seldom in agreement, and which justices are outliers. The 50 year perspective also allows scholars of the court to set empirical benchmarks to evaluate individual terms. For instance, the 2005 term, with an aggregate agreement of 70%, was the high water mark for agreement amongst the Court over the past 50 terms. *See* **Table 1** and **Chart 1.** At least one scholar has described this as a "quiet term."[7] Now, with the Aggregate Harmony Metric, we can empirically demonstrate that the term was unique. It was indeed a statistical outlier, a bit removed from the mean of 60% total justice agreement for the fifty year span.

II. Prior Work

A. Voting Alignments

The genesis for voting alignment matrixes appears[8] to be the work of C. Herman Pritchett in 1941.[9] Pritchett's 1941 article contains a matrix of percentage agreement among the Justices in "Controversial Cases, 1939 and 1940 Terms" (Table III).[10] After a similar article in 1942 (which includes a table of the percentage agreement among the Justices in all non-unanimous cases for the 1941 Term (Chart III)),[11] Pritchett produced a lengthier treatment of the subject in a 1948 book.[12] Table XXII of this work consists of matrixes of percentage agreements for all members of the Court for all non-unanimous opinions of the Court for the terms 1931 through 1946.[13] A subsequent work by Pritchett contains matrixes of percentage agreements for all members of the court for non-unanimous opinions of the Court for the terms 1946-48 (Table 5)[14] and 1949-1952 (Table 7).[15]

In addition to the *Harvard Law Review*, others have published voting alignment and other data about the various terms of the Court. John Sprague published voting

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Most Dangerous Justice: The Supreme Court at the Bar of Mathematics, 70 S. Cal. L. Rev. 63, 90 (1996); Brian K. Landsberg, *Race and the Rehnquist Court,* 66 Tul. L. Rev. 1267, 1346-1352 (1992).

[7] *See* Frederick Schauer, *The Court's Agenda—and the Nation's,* 120 Harv L. Rev. 4, 32 (2006).

[8] *See* J. Woodford Howard, Jr., *Symposium: National Conference on Judicial Biography Objectivity and Hagiography in Judicial Biography: Commentary*, 70 NYU L. Rev. 533, 543 (1995).

[9] C. Herman Pritchett, *Divisions of Opinion Among Justices of the U.S. Supreme Court, 1939-1941,* 35 Am. Pol. Sci. Rev. 890. (1941); For a discussion of Pritchett's work and other similar contributions, *see* G. Edward White, *Unpacking the Idea of the Judicial Center,* 83 N.C. L. Rev. 1089 (2005) and Lee Epstein et. al., *The Political (Science) Context of Judging,* 47 St. Louis U. L. J. 783, 786 (2003).

[10] Pritchett *supra* note 8, at 894.

[11] C. Herman Pritchett, *The Voting Behavior of the Supreme Court, 1941-42,* 4 J. Pol. 491, 497 (1942).

[12] C. Herman Pritchett, The Roosevelt Court: A Study in Judicial Politics and Values 1937-1947 (1948).

[13] *Id.* at 240-248.

[14] C. Herman Pritchett, Civil Liberties and the Vinson Court 182 (1954).

[15] *Id.* at 184.

alignment data for as early as 1916.[16] At least as early as for the 1995 term, *United States Law Week* has published voting alignment matrixes.[17] In addition, *The National Law Journal* also publishes voting alignment data.[18]

Since the 1986 Term, a group of scholars has been publishing annual reviews of the Supreme Court with data such as liberal and conservative trends, voting for the government versus voting for private parties, breakdowns by civil and criminal cases, and other distinctions.[19] Similar data is published in the wonderfully detailed book, *The Supreme Court Compendium: Data, Decisions & Developments.*[20] This work includes voting alignments by issue area: Criminal Procedure, Civil Rights, First Amendment, Due Process, Privacy, Attorneys, Unions, Economics, Judicial Power, Federalism, Interstate Relations, Federal Taxation, and Miscellaneous.[21] The data for these tables comes from a freely available database known as the *U.S. Supreme Court Judicial Database.*[22]

The U.S. Supreme Court Judicial Database was created by political scientist, Harold J. Spaeth,[23] and is widely used by the political science community. The database has been cited by law school scholars and some note its discrepancies[24] with the *Harvard Law Review* statistics. In the future I plan to compare my results from the *Harvard Law Review* data against those from the *Supreme Court Database*. Some feel that the *Supreme Court Database* is more nuanced and transparent as to the processing and categorization of the data.[25] I personally found several minor errors and inconsistencies with the *Harvard* statistics[26] and found myself wanting more information as to how the *Harvard* statistics were compiled.[27]

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[16] John D. Sprague, VOTING PATTERNS OF THE UNITED STATES SUPREME COURT: CASES IN FEDERALISM, 1889-1959 (1968).

[17] Thomas C. Goldstein, *Statistics for the Supreme Court's October Term 1995*, 65 U.S.L.W. 3029 (1996).

[18] *Voting Alignments on the Supreme Court: 1991-92 Term*, NAT'L L.J., Aug. 31, 1992, at S2; Marcia Coyle, *Voting Alignments on the Supreme Court*, NAT'L L.J., Aug. 6, 2001, at C3.

[19] Robert E. Riggs*, Suprme Court Voting Behavior: 1986 Term,* 2 BYU J. Pub. L. 15 (1988); Richard G. Wilkins et al., *Supreme Court Voting Behavior: 2004 Term,* 32 Hastings Const. L. Q. 909 (2005).

[20] Lee Epstein et al., THE SUPREME COURT COMPENDIUM: DATA, DECISIONS & DEVELOPMENTS, 3rd Ed. (2003).

[21] *Id.* at 524-587. (Includes tables for the Vinson Court (1946-1952 Terms) [Table 6-4], Warren Court (1953-1968 Terms)[Table 6-5], Burger Court (1969-1985 Terms)[Table 6-6], Rehnquist Court (1986-2001 Terms)[Table 6-7]).

[22] The S. Sidney Ulmer Project, U.S. Supreme Court Databases http://www.as.uky.edu/polisci/ulmerproject/sctdata.htm

[23] *Id. See also* Harold J. Spaeth & Jeffrey A. Segal, *The U.S. Supreme Court Judicial Data Base: Providing New Insights into the Court*, 83 JUDICATURE 228 (2000); Jeffrey A. Segal & Harlold J. Spaeth, THE SUPREME COURT AND THE ATTITUDINAL MODEL REVISITED (2002); Jeffrey A. Segal & Harold J. Spaeth, THE SUPREME COURT AND THE ATTITUDINAL MODEL 32-73 (1993).

[24] *See* Geraldine Mund, *A Look Behind the Ruling: The Supreme Court and the Unconstitutionality of the Bankruptcy Act of 1978,* 78 Am Bankruptcy L. J. 401, 421 (2004);

[25] *See* Epstein et. al. *supra* note 9.

[26] *The Supreme Court, 1967 Term- The Statistics*, 82 HARV. L. REV. 301, 307 (1968)(Wrong N value for Justice Marshall relative to Justice Black. Should be 70 instead of 170 to be consistent with the other N values for Justice Marshall and the resultant percentages in the 5 year table on p. 311 of the same volume); *The Supreme Court, 1977 Term- The Statistics,* 92 HARV. L. REV. 327, 328 (1978) (Based on the O,S,T,& N values given for Justice Marshall relative to Justice Brennan, the P value should be 91.9 rather than 93.6); *The Supreme Court, 1985 Term- The Statistics,* 100 HARV. L. REV. 304, 305 (1986) (There is a discrepancy as to the N value of Justice Powell relative to Justice White. It is 155 on one half of the matrix

B. Visualizations of Voting Alignments

Over the years there have been several efforts to spatially visualize the relationship of the Justices to one another.[28] In 1941, Pritchett published a linear continuum of the Justices in the 1939 and 1940 terms based on their number of dissents.[29] In 1951, Thurston and Degan used factorial analysis of the voting patterns of the 1943 and 1944 terms to produce three dimensional vector space representations of the Justices.[30] Starting in 1962, Schubert used multidimensional factor analysis (or scaling) of justice voting behavior to produce spatial distributions of the justices.[31] In 1985, Spaeth and Altfeld produced spatial, though non-automated, diagrams of the influence relationships amongst the Justices for the Warren and Burger Courts.[32] More recently, Martin and Quinn used Markov chain Monte Carlo methods with a Bayesian measurement model to produce spatial distributions of justices based on their voting behavior.[33]

Other political scientists are using other statistical techniques based in part on voting behavior to produce spatial distributions of the Justices.[34] Network science researchers Johnson, Borgatti, and Romney have used network science and correspondence analysis techniques to produce visual representations of the later Rehnquist Court voting patterns.[35] Mathematician, Lawrence Sirovich, used vector

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and 156 on the other half. I used the 155 value for my calculations as Justice Powell did not sit with any other Justice 156 times for that particular Term. However, he did sit with several other Justices a total of 155 times.).

[27] *See The Supreme Court, 1956 Term- Business of the Court,* 71 HARV. L. REV. 94, 103 (1957)(Table C and footnote l indicate that there were 33 unanimous cases for the 1956 Term, "including 8 cases decided with concurring votes." Does this mean concurring in the judgment and the reasoning, or just the judgment? In the later case, only 25 are truly unanimous by later *Harvard* standards.)

[28] *See* G. Edward White, *Unpacking the Idea of the Judicial Center,* 83 N.C. L. Rev. 1089 (2005)(Includes a discussion of early statistical efforts that have produced spatial distributions of the Justices in order to find the spatial or ideological center of the Supreme Court.)

[29] Pritchett *supra* note 8 at 894. For a more recent approach as to linear, spatial modeling taking into account more variables and in the context of the confirmation process *see* Jeffrey A. Segal et. al., *A Spatial Model of Roll Call Voting: Senators, Constituents, Presidents and Interest Groups in Supreme Court Confirmations*, 36 AM. J. POL. SCI. 96 (1992).

[30] L.L. Thurstone and J.W. Degan, *A Factorial Study of the Supreme Court,* 37 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED SATES OF AMERICA 628 (1951).

[31] Glendon Schubert, *The 1960 Term of the Supreme Court: A Psychological Analysis,* 56 AM. POL. SCI. REV 90 (1962); Glendon Schubert, *Judicial Attitudes and Voting Behavior: The 1961Term of the United States Supreme Court,* 28 LAW & CONTEMP. PROBS. 100 (1963).

[32] Harold J. Spaeth,

[33] Andrew D. Martin & Kevin M. Quinn, *Dynamic Ideal Point Estimation via Markov Chain Monte Carlo for the U.S. Supreme Court, 1953-1999,* 10 Pol. Analysis 134 (2002); Lee Epstein et al., *Ideological Drift among Supreme Court Justices: Who When, and How Important?* Forthcoming, Northwestern University Law Review, available at: http://adm.wustl.edu/media/working/prefchange.pdf. *See also,* Andrew D. Martin et. al., *The Median Justice on the United States Supreme Court,* 83 N. C. L. REV. 1275 (2005); Lee Epstein et al., *The Political (Science) Context of Judging,* 47 ST. LOUIS. U. L. J. 783, 797 (2003).

[34] *See* Lee Epstein et al., *The Judicial Common Space.* Available at: https://www.law.northwestern.edu/faculty/conferences/research/Epstein.pdf.

[35] Jeffrey C. Johnson et al., "Analysis Of Voting Patterns In U.S. Supreme Court Decisions" Sunbelt XXV, International Sunbelt Social Network Conference, Redondo Beach, CA, February 16-20, 2005 (abstract available at: http://www.socsci.uci.edu/~ssnconf/conf/SunbeltXXVProgram.pdf).

models and singular value decomposition to produce two dimensional representations of the voting patterns of the Rehnquist Court.[36] In addition, there have been numerous line charts showing various aspects of the work of the court. For instance, Epstein and her collaborators published a line chart showing the "Percentage of U.S. Supreme Court Cases with at Least One Dissenting Opinion, 1800-2000 Terms."[37]

C. Multidimensional Scaling (MDS) and the Law

As this article utilizes Multidimensional Scaling (MDS), it is appropriate to survey the use of the technique by legal scholars generally, as well as those that have used it to produce spatial distributions of Supreme Court Justices based on their voting behavior. Most references in the law review literature are either by psychologists or health professionals, people citing psychologists or health professionals, people writing about psychological or health themes, or in law and psychology or law and health related journals.[38] For instance, Blumenthal used multidimensional scaling to produce spatial distributions of various crimes based on the public's perception of the seriousness of the various crimes.[39] Also, there is a group of scholars that has employed MDS to map social networks associated with various legal issues.[40] These publications include spatial maps of the networks[41] that are very similar to those produced in information science or social network science. Additionally, this author did a MDS analysis of top level West Topics in Supreme Court opinions over a sixty year span with the goal of creating a domain map of the Supreme Court topic space for teaching purposes.[42]

The use of MDS to produce visualizations of voting patterns in courts appears to have originated from its use to produce visualizations of Congressional roll-call votes.[43] Grofman and Brazill have applied MDS to voting patterns of the Supreme Court. However, their focus has been to reduce the multidimensional space to one dimension. In

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[36] Sirovich, L. (2003). A pattern analysis of the second Rehnquist U.S. Supreme Court. PNAS, 100(13), 7432-7437.

[37] Epstein et al *supra* note ___ at 787.

[38] *See* Michael T. Heaney, *Brokering Health Policy: Coalitions, Parties, and Interest Group Influence,* 31 J. HEALTH, POL., POL., AND L. 887 (2006); Maggie E. Reed, *There's No Place Like Home; Sexual Harassment of Low Income Women in Housing,* 11 PSYCH., PUB. POL., & L. 439 (2005);

[39] Jeremy A. Blumenthal, *Perceptions of Crime: A Multidimensional Analysis with Implications for Law and Psychology* (October 2006). Available at SSRN: http://ssrn.com/abstract=942311

[40] John P. Heinz ET AL., *Lawyers for Conservative Causes: Clients, Ideology, and Social Distance,* 37 L. & SOC. REV. 5 (2003); John P. Heinz ET AL., *The Constituencies of Elite Urban Lawyers,* 31 L. & SOC. REV. 441 (1997); John P. Heinz & Peter M. Manikas, *Networks Among Elites in a Local Criminal Justice System,* 26 L. & SOC. REV. 831 (1992); Robert L. Nelson ET AL., *Lawyers and the Structure of Influence in Washington,* 22 L. & SOC. REV. 237 (1988).

[41] John P. Heinz ET AL., *Lawyers for Conservative Causes: Clients, Ideology, and Social Distance,* 37 L. & SOC. REV. 5, 25, 31 (2003); John P. Heinz ET AL., *The Constituencies of Elite Urban Lawyers,* 31 L. & SOC. REV. 441, 444, 452, 458 (1997); John P. Heinz & Peter M. Manikas, *Networks Among Elites in a Local Criminal Justice System,* 26 L. & SOC. REV. 831, 842, 847 (1992); Robert L. Nelson ET AL., *Lawyers and the Structure of Influence in Washington,* 22 L. & SOC. REV. 237, 289 (1988).

[42] Peter A. Hook, *Visualizing the Topic Space of the United States Supreme Court* (December 1, 2006). Indiana Legal Studies Research Paper No. 68 Available at SSRN: http://ssrn.com/abstract=948759

[43] *See* Bernard Grofman and Tomothy J. Brazill, *Identifying the median justice on the Supreme Court through multidimensional scaling: Analysis of "natural courts" 1953-1991,* 112 Pub. Choice 55, fn 1 (2002); Keith T. Poole, Spatial Models of Parliamentary Voting (2005).

other words, they use MDS to produce a linear continuum of the Justices serving on any particular natural court (composed of nine justices) to identify the central or median justice.[44] At least one scholar has produced two dimensional layouts of a particular Court term using MDS.[45] However, the resultant visualizations are contained on a course website and appear to be more of a demonstration of the technique than an attempt to garner insight into the Supreme Court.[46]

D. Network Visualizations and the Law

Because this article uses network visualization techniques to visualize the relationship of the justices based on their voting behavior, it is appropriate to survey the growing body of legal scholars doing similar work with legal networks. Smith, Cross and their collaborators utilize a dataset of the citation interlinkages of every federal and state case on Lexis as well as the citation interlinkages of 385,000 legal journal articles.[47] Chandler utilizes the software program Mathematica to evaluate a dataset of the citation interlinkages amongst Supreme Court cases from 1831 to 2005.[48] Chandler has also written on the network structure of the Uniform Commercial Code.[49] Political scientist Fowler and his collaborators also utilize the citation interlinkages for Supreme Court cases retrieved by automated means from Lexis to identify outwardly important cases and inwardly important cases.[50] The CITE-IT Project analyzes the citation network of federal level regulatory takings cases.[51]

III. Methodology

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[44] Grofman and Brazill *supra* note ___.

[45] http://voteview.com/congress_UCSD_2_February_2006.htm

[46] *Id.*

[47] Smith, Thomas A., "The Web of Law" (Spring 2005). San Diego Legal Studies Research Paper No. 06-11 Available at SSRN: http://ssrn.com/abstract=642863 or DOI: 10.2139/ssrn.642863; Cross, Frank B., Smith, Thomas A. and Tomarchio, Antonio, "Determinants of Cohesion in the Supreme Court's Network of Precedents" (August 2006). San Diego Legal Studies Paper No. 07-67 Available at SSRN: http://ssrn.com/abstract=924110; Cross, Frank B. and Smith, Thomas A., "The Reagan Revolution in the Network of Law" (June 2006). Available at SSRN: http://ssrn.com/abstract=909217;

[48] Chandler, S. J. (2005). The Network Structure of Supreme Court Jurisprudence. Paper presented at the 2005 International Mathematica Symposium. Available at SSRN: http://ssrn.com/abstract=742065.

[49] Chandler, S. J. (2005). *The Network Structure of the Uniform Commercial Code: It's A Small World After All*. Paper presented at the 2005 Wolfram Technology Conference. Available at: http://library.wolfram.com/infocenter/Conferences/5800/.

[50] Fowler, J. H., Johnson, T. R., Spriggs, J. F. I., Jeon, S., & Wahlbeck, P. J. (In Press). Network Analysis and the Law: Measuring the Legal Importance of Supreme Court Precedents. Political Analysis; James H. Fowler and Sangick Jeon (Working Paper), *The Authority of Supreme Court Precedent: A Network Analysis*, Available at: http://jhfowler.ucsd.edu/; Fowler, J. H. (2006). Connecting the Congress: A Study of Cosponsorship Networks. Political Analysis, 14, 456 - 487.

[51] McIntosh, Wayne., Cousins, Ken., Rose, James., Simon, Stephen., Evans, Mike., Karnes, Kimberly., McTague, John. and Pearson-Merkowitz, Shanna. "Using Information Technology to Examine the Communication of Precedent: Initial Findings and Lessons From the CITE-IT Project" Paper presented at the annual meeting of the Western Political Science Association, Marriott Hotel, Oakland, California, 2005-03-17 Online <.PDF>. 2007-02-25. Available at: http://www.bsos.umd.edu/gvpt/CITE-IT/Documents/McIntosh%20etal%202005%20WPSA.pdf.

Data Harvesting and Matrix Algebra

The data for this article comes mostly from the *Harvard Law Review's* annual statistical review of the Supreme Court term.[52] The author placed each year's data into a standardized spreadsheet matrix that had columns and rows for each Justice that participated in an issued opinion during the applicable time span—1956 to 2005 Terms (roughly October 1956 to July 2006.) *See* **Table 2.** The author created one such spreadsheet per term for each of the different *Harvard Law Review* counting methods (O,[53] S,[54] D,[55] N[56])[57]. Relying on a consistent ordering of the Justices, it was then easy to aggregate the data for each of the individual terms using Microsoft Excel. In other words, for each method type (O,S,D, & N), the author created one workbook file that had 50 individual sheets whose cell contents could easily be aggregated on the 51st sheet using the function: SUM(Sheet1:Sheet50!E3) where E3 was a particular cell. Thus, the Aggregate Harmony Metric is the aggregation of all O cells divided by the aggregation of all N cells ($\Sigma O / \Sigma N$). These percentages were easily generated with a simple Excel function such as: Sheet1!D3/Sheet3!D3 where the cells in Sheet 1 contained all of the aggregated O values and the cells in Sheet 3 contained all of the aggregated N values. *See* **Table 2.**

MDS

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[52] *See* footnote 2.

[53] O Method. This method counts the number of agreements in "opinions of the Court (O)" as indicated by the cell corresponding with any two Justices for that particular term. 71 HARV. L. REV. 94, 103 (1957). Subsequent issues would define the method thus: """O" represents the number of decisions in which a particular pair of Justices agreed in an opinion of the Court or an opinion announcing the judgment of the Court." 120 Harv. L. Rev. 372, 376 (2006).

[54] S Method. This method counts the number agreements in "separate opinions including concurrences and dissents" as indicated by the cell corresponding with any two Justices for that particular term. 71 HARV. L. REV. 94, 103 (1957). Subsequent issues would define the method thus: ""S" represents the number of decisions in which two Justices agreed in any opinion separate from the opinion of the Court. Justices who together join more than one separate opinion in a case are considered to have agreed only once." 120 Harv. L. Rev. 372, 376 (2006). The language as to Justices who "join more than one separate opinion in a case" being considered to "have agreed only once," did not come about until the 1996 Term. 111 HARV. L. REV. 431, 433. Thus, one would have to look at actual cases and voting patterns to see if the method was done consistently over the entire dataset.

[55] D Method. This method was introduced for the review of the 1987 term. ""D" represents the number of decisions in which the two Justices agreed in either a majority, dissenting, or concurring opinion." 102 Harv. L. Rev. 350, 252. It was in response to the problem of aggregated O and S totals leading to greater than 100 percent agreement. *See* 102 Harv. L. Rev. 350, 352 ("It should be noted that the "P" totals have been computed differently than they have in past versions of this table. In the past, the "P" line was calculated by dividing the sum of the "O" and "S" lines by "N." This method of calculation overstated "P" whenever two Justices had agreed more than once in any one decision.")

[56] N Method. This method counts "the number of times that the Justices participated in the same case." 71 HARV. L. REV. 94, 103 (1957). Subsequent definitions were very similar: ""N" represents the number of decisions in which both Justices participated, and thus the number of opportunities for agreement." 120 Harv. L. Rev. 372, 376 (2006).

[57] T Method. This is merely the count of overall agreement, O plus S. Because this could be derived automatically from the O and S matrixes, the author did not input the data for this value by hand. The same is also true for the P Method. This is true whether "P" is derived by dividing "T" by "N" (T/N) as it was prior to the 1987 Term or by dividing "D" by "N" as it was for the 1987 Term and following.

The visualizations that are **Charts 4 & 5** were produced with the multidimensional scaling (MDS) algorithm embedded in the R statistical software package.[58] The mathematics and principles behind MDS have been written about extensively[59] and will not be replicated here. Because, the technique is based on the notion of distance, I subtracted the co-voting percentages from 100 to get distance integers—the larger the number, the greater the distance between justices and vice-versa. Poole eloquently analogizes the MDS layout process to that of taking the mileage matrix of miles between cities found on many highway maps and creating a spatial distribution of the cities from that matrix.[60] It is worth noting that with data that is not inherently spatial to begin with, there might be inherent stress in making everything fit. Also, a user can decide how many dimensions to which he or she wants to reduce the data with differing levels of stress. Because the first two dimensions capture the most variance in the data, these are what are represented in **Charts 4 & 5.**

The MDS algorithm is a deterministic process. This means that repeated processing of the data will produce similar spatial distributions. (However, the image might be inverted up or down or left to right. It is as if the same two-dimensional slice through the solution space were viewed upside down or from the other side.) Stress tests reveal how well the variability of the data is captured by the chosen amount of dimensions. After conducting stress tests as to Supreme Court co-voting data, Grofman & Brazil were comfortable reducing all of the voting space to one dimension (a linear continuum) and note that a two-space solution "almost perfectly explain(ed) the data."[61] This is fortunate as two-space, or two-dimensional, solutions are perfect for printed visualizations.

Network Visualizations

To produce additional visualizations of the voting relationships on the Court (**Charts 3, 7, & 8**), I used the spring force layout algorithm embedded in the network analysis software, Pajek.[62] Network analysis is based on nodes and links. As to my data, the Supreme Court Justices became the nodes and the links between them were a varying quantity corresponding to their percentage co-voting agreement. The spring force layout

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[58] Free software available at:The R Project for Statistical Computing (http://www.r-project.org/).

[59] *See* Blumenthal *supra* note __, at 4-6; Grofman & Brazill *supra* note __; Joseph B. Kruskal & Myron Wish, MUTLIDIMENSIONAL SCALING (1978).

[60] Poole *supra* note ___, at 1.

[61] Grofman & Brazill *supra* note __ at 58. *See also* Andrew D. Martin et al., *Median Justice on the United States Supreme Court,* 83 N.C.L.Rev. 1275, 1281 (2005)(" Nearly all statistical work on the United States Supreme Court suggests that the issue space is single-dimensional. See, e.g., Bernard Grofman & Timothy Brazill, Identifying the Median Justice on the Supreme Court through Multidimensional Scaling: Analysis of "Natural Court" 1953-1991, 112 Pub. Choice 55, 58 (2002) (noting that the single dimension solution explains much of the Justices' voting behaviors)").

[62] V. Batagelj, A. Mrvar: Pajek – Program for Large Network Analysis. Available at: http://vlado.fmf.uni-lj.si/pub/networks/pajek/; W. de Nooy, A. Mrvar, V. Batagelj: Exploratory Social Network Analysis with Pajek, Structural Analysis in the Social Sciences 27, Cambridge University Press, 2005; V. Batagelj, A. Mrvar: Pajek – Analysis and Visualization of Large Networks, In J¨unger, M., Mutzel, P. (Eds.): Graph Drawing Software. Springer (series Mathematics and Visualization), Berlin 2003. 77-103.; V. Batagelj, A. Mrvar: Pajek – Program for Large Network Analysis. Connections, 21(1998)2, 47-57.

algorithm used by the software is analogous to all the nodes being pulled together by rubber bands with the strength of the pull (and thus the proximity of the layout of the nodes) determined by the weight of the link. (Links are sometimes called edges and in this case are measure of co-voting percentages.) The layout algorithm is stochastic. This means that repeated processing of the data will produce different images. However, with complex node and link structures, the resultant images look more or less the same. (The orientation may be different and some nodes will be slightly different compared to each other.) However, the advantage of the network layout approach is that it can accommodate instances in which there are no ties between nodes as in the layout of all the Justices in the 50 year dataset (**Chart 3).** MDS, because it is based on distance, cannot handle such a structure in which there are entities that have no relationships. (A zero value corresponds to no distance and the two items are thought to be right on top of each other.)

IV. Observations, Insights and Future Directions

Aggregate Harmony Metric

The impetus for the Aggregate Harmony Metric is my desire to produce normalized spatial visualizations of the voting agreement per term for the entire 50 years of the dataset. In other words, I want to produce visualizations similar to **Charts 4 & 5** for each Term of the Court and then combine them in an animation. However, it occurred to me that for the more rancorous, divisive terms that the Justices should be displayed further apart in the voting space. Similarly, for terms with high aggregate agreement, the justices should be portrayed closer together. The Aggregate Harmony Metric functions as a simple means to make such an evaluation.

Table 1 provides the Aggregate Harmony Metric for each Term of the Court in the column labeled Aggregate Percentage Agreement (O Method). As can be seen from the line graph (**Chart 1**), the aggregate percentage agreement for the Court appears to seesaw through the 50 years of the dataset—from a low of 50% to a high of 70%. The low value of 50% is for the 1970 Term. This was the outset of the change of direction from the more liberal Warren Court to the more conservative Burger Court. Justice Blackmun had just been appointed and was still voting solidly with his childhood friend,[63] Chief Justice Burger (78% voting agreement using the *Harvard Law Review* O Method[64]).[65] Indeed, a contemporaneous account observed that "the Warren Court momentum has been brought to a screeching halt"[66] by the two new Nixon appointees Burger and Blackmun. At first glance, an Aggregate Harmony Metric of 50% seems

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[63] Linda Greenhouse, BECOMING JUSTICE BLACKMUN: HARRY BLACKMUN'S SUPREME COURT JOURNEY (2005).
[64] *See* 85 HARV. L. REV. 344, 351 (1971).
[65] This is in marked contrast to the voting agreement (O Method) for the last term the two served together (1985) which was 48%. 100 HARV. L. REV. 304, 305 (1986).
[66] *Highlights of the Term,* 85 HARV. L. REV. 40, 40 (1971)(*citing* Kurland, *The Burger Court Shows Its Stripes,* 18 THE LAW SCHOOL RECORD 7, 9 (1971)(University of Chicago Law School)).

implausible.[67] As to the 1970 Term, however, of the 122 full opinions, less than 20% were unanimous (23).[68] Furthermore, there were "15 major cases … in which the Court was so split that the cases were decided without a majority opinion."[69] This is in contrast to two such cases for each of the two previous terms.[70] Additionally, seven cases were decided by a 4 to 4 vote[71] and there were twenty cases decided by a 5 to 4 vote.[72]

Contrast this to the 2005 Term in which 44% of the cases were unanimous (36 out of 81)[73] and there were only nine, 5 to 4 decisions.[74] This 'quiet' year had the highest Aggregate Harmony Metric (70%) of the entire 50 term span. This was most likely the result of several things: (1) O'Connor participating in 24 of the least controversial written opinions at the beginning of the term while Alito was going through the confirmation process, (2) the transition time after O'Connor's announced retirement and Rehnquist's death in which the Court might have been less likely to grant certiorari in controversial cases, and (3) efforts as to consensus building by the new Chief Justice Roberts. **Table 3** displays the mean, median, mode, and various quartile distributions for all 50 of the Aggregate Harmony Metric values.

Table 4 reports the Aggregate Harmony Metric values for the tenure of each of the Chief Justices in the dataset. Consistent with the conventional understanding of the history of the Supreme Court, the Burger Court was a transitional time between the more liberal Warren Court and the more conservative Rehnquist Court. As might be expected, the Court of transition (the Burger Court) has a lower Aggregate Harmony value (57%) than either the Warren Court (59%) or the Rehnquist Court (60%). **Table 5** and **Chart 2** tell a similar story at a finer scale of gradation (5 Term bins). One scholar has noted a change in the voting blocks of close decisions immediately after *Bush v. Gore*.[75] One can look at the Aggregate Harmony Metric values to see that the 2000 Term (the year that the divisive opinion came out early in the Term) was itself higher than the median (61%), that the 2001 Term took a dip below the median (58%), that the 2002 Term was well above the median (63%), and that the remaining Rehnquist Terms (2003 & 2004) were again at the median (59%).

Voting Superlatives

One benefit of having aggregated the *Harvard Law Review's* statistics for all 50 Terms (1956-2005) is the ability to see the highest and lowest voting agreement percentages between any two justices over the span of the dataset. **Tables 1, 2, 4, 6, 7, 8, and 9 and Chart 9** report various aspects of these voting superlatives. One can see that

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[67] Assume that there were 100 cases for the term and all were decided by a 5 to 4 vote by the same block of justices in the majority and in the dissent. This would yield an Aggregate Harmony Metric of 28% as the four dissenting justices are not counted (using the O Method) as having sided with either the 5 majority justices or each of themselves. Thus, $\Sigma O = 1000$ and $\Sigma N = 3600$ and the Aggregate Harmon Metric ($\Sigma O/ \Sigma N$) = .2777.

[68] 85 HARV. L. REV. 344, 349 (1971).

[69] *Id.* at 352.

[70] *Id.*

[71] *Id.* at 353

[72] *Id.*

[73] 120 Harv. L. Rev. 372, 377 (2006).

[74] *Id.* at 378.

[75] David Cole, *TheLiberal Legacy of Bush v. Gore,* 94 GEORGETOWN L. J. 1427 (2006).

Warren and Marshall are at a 50 year high for those having decided more than 100 cases together (88%). *See* **Table 7.** Indeed, Stephen Wermiel noted Marshall's proclivity to vote with Brennan in his analysis of the first ten years of Justice Thomas's tenure on the Court in regards to the assertion that Thomas was a "Scalia clone."[76] In fact, the percentage of voting agreement between Scalia and Thomas for the time range of the dataset is 67%. *See* **Table 2.** This value is not even in the top 25. *See* **Table 7.** Nor is it even in the forth quartile. *See* **Table 10**. Similarly, the polemic nature of Justice Douglas is evident in the fact that he is one of the Justices in each of the first six, lowest voting agreement percentages. *See* **Table 8.**

There is utility in such measures. For one, the data might be of use to those scholars evaluating the "Freshman Effect."[77] Also, it provides an empirical means of assigning labels. For instance, those in the fourth quartile might be considered ideological allies while those in the first quartile might be considered ideological opponents. Additionally, I plan to use the data to modify subsequent spatial layouts of the Justices based on their voting agreements. For instance, for those justices whose voting agreements place them in the 2nd and 3rd quartile, I plan to retain their actual distances as represented by the layout algorithm. However, I think it would be useful to double the distance of those in the first quartile and halve the distances for those in the forth quartile. *See* **Table 10.** This 'distortion' would serve to heighten the relationships between justices and reveal more strongly those that are ideologically close together and those that are ideologically far apart.

Visualizations

As an information science researcher, I am actively involved in the creation of knowledge domain visualizations (KDVs). KDVs are the "graphic rendering of bibliometric data designed to provide a global view of a particular domain, the structural details of a domain, the salient characteristics of a domain (its dynamics, most cited authors or papers, bursting concepts, etc.) or all three."[78] KDVs (also known as domain maps) respond to the desire of cognitive and educational psychologists to give learners "a big picture, a schema, a holistic cognitive structure[.]"[79] **Chart 3** provides such a big picture overview of the last 50 terms of the Supreme Court. There is an implied element

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[76] *See* Stephen J. Wermiel, Clarence Thomas After Ten Years: Some Reflections, 10 AM. U. J. GENDER SOC. POL'Y & L. 315, 316 (2002);

[77] See Christopher E. Smith, *The Impact of New Justices: The U.S. Supreme Court and Criminal Justice,* 30 Akron L. Rev. 55 (1996); Terry Bowen & John M. Scheb II, Reassessing the "Freshman Effect": The Voting Bloc Alignment of New Justices on the United States Supreme Court, 1921-90, 15 POL. BEHAV. 1 (1993); Terry Bowen & John M. Scheb, II, Freshman Opinion Writing on the U.S. Supreme Court, 1921-1991, 76 JUDICATURE 239 (1993); Robert Dudley, The Freshman Effect and Voting Alignments: A Reexamination of Judicial Folklore, 21 AM. POL. Q. 360 (1993); Saul Brenner, Another Look at Freshman Indecisiveness on the United States Supreme Court, 16 POLITY 320 (1983); Edward Heck & Melinda Hall, Bloc Voting and the Freshman Justice Revisited, 43 J. POL. 852 (1981); see also David W. Allen, Voting Blocs and the Freshman Justice on State Supreme Courts, 44 W. POL. Q. 727 (1991).

[78] Hook, Peter A. and Börner, Katy. (2005) Educational Knowledge Domain Visualizations: Tools to Navigate, Understand, and Internalize the Structure of Scholarly Knowledge and Expertise. In Amanda Spink and Charles Cole (eds.) New Directions in Cognitive Information Retrieval. Springer-Verlag at 194.

[79] C. K. West, et. al., INSTRUCTIONAL DESIGN: IMPLICATIONS FROM COGNITIVE SCIENCE (1991) at 58.

of time moving from left to right. Viewers get a rough sense as to which Justices served with whom. Long serving justices are pulled to the center of the diagram.

Additionally, it is my vision that **Chart 3** will soon function as the navigational frontispiece of an online, informational website about the Court. By selecting two justices, viewers would see their co-voting percentages as well how that percentage compared to their contemporaries on the Court. Furthermore, users would be able to select a particular Term and only those Justices that served on the Court for that Term would be highlighted. The rest would be grayed out. Users could then navigate to MDS spatial distributions of the Justices for that particular Term and, aggregated with data from other recent terms, the spatial distributions for particular topics (free speech, federalism, criminal procedure, etc.)

Charts 4 & 5 are MDS produced spatial distributions of the co-voting percentages in non-unanimous cases of the longest serving group of the same nine Justices of the entire 50 year dataset (1994 to 2003 Terms)—a large chunk of the Rehnquist Court. **Chart 4,** the aggregate co-voting figures for this time makes the ideological landscape of the court readily available to a novice. One can see that Scalia and Thomas are ideological allies far removed from the more liberal wing of the Court (Stevens, Ginsburg, Souter and Breyer). One can readily perceive that Stevens is the most marginalized Justice and most apt to go his own way. One can also see the most pronounced 5 to 4 voting block for this time (O'Connor, Kennedy, Rehnquist, Scalia and Thomas, vs. Stevens, Ginsburg, Souter, and Breyer.) *See Chart 6.*

Chart 5 is the MDS produced spatial distribution of the co-voting percentages in non-unanimous cases for the same time period (1994 to 2003 Terms) that the *Harvard Law Review* has identified in its Table of Contents for its annual review of the Court Term as dealing with Freedom of Speech and Expression.[80] One can see that as compared to **Chart 4**, Stevens have moved from being marginalized to assuming the role of a centrist. Furthermore, Rehnquist, Scalia, and Thomas have themselves become marginalized and have moved away from each other. I do not pretend to be a constitutional scholar in the area of free speech. This calls to attention to the issue that most visualizations should be validated by experts in the field to expose errors. For instance, maybe one or more of the cases identified as dealing with Freedom of Speech and Expression by the *Harvard Law Review* in its Table of Contents is only marginally so and significantly distorts the visualization.

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[80] 25 cases total (Virginia v. Hicks (2002) was not included because it was a 9 to 0 decision): Ashcroft v. ACLU, 542 U.S. 656 (2003); McConnell v. FEC, 540 U.S. 93 (2003); Virginia v. Black (2002); United States v. American Library Ass'n (2002); Ashcroft v. Free Speech Coalition (2001); Republican Party of Minnesota v. White (2001); Watchtower Bible & Tract Society of New York, Inc. v. Village of Stratton (2001); Bartnicki v. Vopper (2000); Federal Election Commission v. Colorado Republican Federal Campaign Committee (2000); Legal Services Corp. v. Velazquez (2000); Board of Regents of the University of Wisconsin v. Southworth (1999); Hill v. Colorado (1999); Nixon v. Shrink Missouri Government PAC (1999); Buckley v. American Constitutional Law Foundation (1998); Glickman v. Wileman Bros. & Elliott, Inc (1996); Reno v. ACLU (1996); Schenck v. Pro-Choice Network (1996); 44 Liquormart, Inc. v. Rhode Island (1995); Board of County Commissioners v. Umbehr (1995); Colorado Republican Federal Campaign Committee v. FEC (1995); Denver Area Educational Telecommunications Consortium, Inc. v. FCC (1995); McIntyre v. Ohio Elections Commission (1994); Florida Bar v. Went for It, Inc. (1994); United States v. National Treasury Employees Union (1994); Rosenberger v. Rector & Visitors of the University of Virginia (1994).

Chart 6 emphasizes that O'Connor's change from one voting bloc to the next accounts for 63% of all 5 to 4 decisions (1994 to 2003 Terms).[81] Thus, she is a quintessential swing vote. Furthermore, when Kennedy votes with the four liberal Justices this accounts for an additional 8% of all 5 to 4 decisions.[82] The two of them together, covering just these three different voting bloc scenarios, account for 71% of all 5 to 4 decisions during the 1994 to 2003 Terms.[83] The status of O'Connor and, to a lesser extent, Kennedy, as swing voters is visually portrayed in **Charts 7 & 8.** In **Chart 7,** using the network graphic metaphor (nodes and edges), the lines between the Justices represent those voting together greater than 50% of the time in non-unanimous cases. This effectively communicates O'Connor's swing vote status between the liberal and conservative voting blocs for the time span. When the threshold is lowered by a mere percentage point as is the case in **Chart 8**, it can be seen that Kennedy also serves as an occasional swing vote between the liberal and conservative voting blocs. These visualizations effectively convey to a novice what almost every constitutional scholar or political scientist already knows. Just how effectively awaits rigorous user testing.

V. Conclusion

The Aggregate Harmony Metric is a tool to evaluate the relative rancorousness of the various terms of the Supreme Court. The insight from this metric is enhanced by knowledge of the all time high or low co-voting percentages between the Justices. Additionally, visualizations help to make the knowledge of veteran Court watchers quickly available and digestible to novices. All of this work responds to my desire to provide insights as to the Court for use in teaching (pedagogy). I think that metrics and visualizations can go a long way towards making the tacit knowledge of expert scholars of the Court available to both law students and the general public. Hard work, data mining, statistical data crunching, and visualization tools with built-in layout algorithms assist in making this possible. It is my hope that the field of information visualization as it relates to legal topics is still in its infancy and ripe for substantial growth.

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[81] 82 times O'Connor voted with Kennedy, Rehnquist, Scalia, and Thomas against Stevens, Breyer, Ginsburg, and Souter. 28 times O'Connor voted with Stevens, Breyer, Ginsburg, and Souter against Kennedy, Rehnquist, Scalia, and Thomas. These totals, 82 plus 28 (110), account for 63% of the 175 5 to 4 votes for the time period. *Harvard Law Review.*

[82] Kennedy voted 8 times with Stevens, Breyer, Ginsburg, and Souter against O'Connor, Rehnquiest, Scalia, and Thomas. *Harvard Law Review.*

[83] 124 of all of the 175, 5 to 4 decisions.

Table 1 – Aggregate Co-Voting Statistics for the United States Supreme Court (1956-2005 Terms)

Term	Court	Justices (When more than 9 justices are involved in issuing opinions for a particular term, those present for only part of the term are denoted with the number of written cases decided in which they participated. This number is determined by the highest number of cases in which two justices participated (the Harvard N number) that includes the particular justice sitting for only part of a term.)	Aggregate Percentage Agreement (O Method)	Cumulative O Count	Cumulative N Count	Highest Percentage Agreement (O Method)	Highest Percentage Agreement Justice 1	Highest Percentage Agreement Justice 2	Lowest Percentage Agreement (O Method)	Lowest Percentage Agreement Justice 1	Lowest Percentage Agreement Justice 2	"Full Opinions"
1956	Warren 3 & 4	Black, Reed (42), Frankfurter, Douglas, Burton, Clark, Warren, Harlan, Brennan, Whittaker (39)	57	2069	3631	85	Reed	Clark	37	Douglas	Harlan	115
1957	Warren 4	Black, Frankfurter, Douglas, Burton, Clark, Warren, Harlan, Brennan, Whittaker	56	2351	4188	71	Black Warren	Warren Brennan	40	Douglas	Harlan	119
1958	Warren 5	Black, Frankfurter, Douglas, Clark, Warren, Harlan, Brennan, Whittaker, Stewart	58	2206	3795	72	Clark Whittaker	Whittaker Stewart	38	Douglas	Harlan	112
1959	Warren 5	Black, Frankfurter, Douglas, Clark, Warren, Harlan, Brennan, Whittaker, Stewart	51	1878	3651	78	Warren	Brennan	28	Frankfurter	Douglas	105
1960	Warren 5	Black, Frankfurter, Douglas, Clark, Warren, Harlan, Brennan, Whittaker, Stewart	55	2257	4120	74	Warren	Brennan	34	Frankfurter	Douglas	118
1961	Warren 5 & 6	Black, Frankfurter, Douglas, Clark, Warren, Harlan, Brennan, Whittaker (34), Stewart, White (16)	62	1672	2681	94	Clark	White	37	Black	Harlan	96
1962	Warren 7	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Goldberg	59	2245	3825	83	Warren	Brennan	32	Douglas	Harlan	117
1963	Warren 7	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Goldberg	67	2957	4440	90	Warren	Brennan	42	Black	Harlan	127

Year	Court	Justices										
1964	Warren 7	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Goldberg	58	1817	3146	89	Warren	Brennan	29	Douglas	Harlan	101
1965	Warren 8	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Fortas	64	2095	3298	87	Warren	Brennan	36	Douglas	Harlan	107
1966	Warren 8	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Fortas	59	2412	4104	85	Warren	Brennan	33	Douglas	Harlan	119
1967	Warren 9	Black, Douglas, Warren, Harlan, Brennan, Stewart, White, Fortas, Marshall	65	2624	4023	90	Warren	Brennan	46	Black Douglas	Harlan Harlan	127
1968	Warren 9	Black, Douglas, Warren, Harlan, Brennan, Stewart, White, Fortas, Marshall	62	2389	3835	92	Warren Brennan	Brennan Marshall	36	Black	Harlan	122
1969	Burger 1	Black, Douglas, Harlan, Brennan, Stewart, White, Marshall, Burger (8 JUSTICES ONLY)	62	1558	2509	83	Brennan	Marshall	44	Douglas	Burger	94
1970	Burger 2	Black, Douglas, Harlan, Brennan, Stewart, White, Marshall, Burger, Blackmun	50	2118	4244	78	Burger	Blackmun	36	Douglas	Harlan	122
1971	Burger 3	Douglas, Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist	54	2311	4279	69	Stewart	White	26	Douglas	Rehnquist	151
1972	Burger 3	Douglas, Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist	55	3140	5666	80	Burger	Blackmun	28	Douglas	Rehnquist	164
1973	Burger 3	Douglas, Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist	56	3079	5479	77	Burger	Rehnquist	28	Douglas	Rehnquist	157
1974	Burger 3	Douglas, Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist	59	2779	4692	77	Blackmun	Powell	31	Douglas	Rehnquist	137
1975	Burger 3 & 4	Douglas (5), Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens (80)	58	2905	5050	79	Burger	Powell	20	Douglas	White	159
1976	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	55	2693	4890	69	White Rehnquist	Powell Powell	36	Brennan	Burger	142
1977	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	51	2279	4458	62	Brennan	Marshall	32	Brennan	Rehnquist	135
1978	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	55	2597	4707	70	White Burger	Blackmun Powell	34	Brennan Marshall	Rehnquist Rehnquist	138
1979	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	54	2801	5193	69	Burger	Powell	30	Marshall	Rehnquist	149
1980	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	54	2614	4805	69	White Burger Burger	Powell Powell Rehnquist	35	Marshall	Rehnquist	138
1981	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	54	3187	5887	66	Rehnquist	O'Connor	37	Brennan	Rehnquist	167

Year	Court	Justices											
1982	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	58	3361	5792	77	White Burger	Burger Powell	37	Marshall	Rehnquist	162
1983	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	65	3689	5697	84	White Burger	Burger O'Connor	45	Marshall	Rehnquist	163
1984	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	66	3253	4965	81	Burger Powell	O'Connor O'Connor	47	Marshall	Rehnquist	151
1985	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	56	3136	5610	81	Powell	O'Connor	37	Marshall	Rehnquist	159
1986	Rehnquist 1	Brennan, White, Marshall, Blackmun, Powell, Rehnquist, Stevens, O'Connor, Scalia	56	2998	5385	77	Rehnquist	Powell	39	Marshall Marshall	Rehnquist Scalia	152
1987	Rehnquist 2	Brennan, White, Marshall, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy	66	2904	4403	83	White	Kennedy	51	Marshall	Scalia	142
1988	Rehnquist 2	Brennan, White, Marshall, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy	61	3087	5040	85	Rehnquist	Kennedy	47	Marshall	O'Connor	143
1989	Rehnquist 2	Brennan, White, Marshall, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy	53	2633	4988	75	White	Rehnquist	35	Marshall	Scalia	139
1990	Rehnquist 3	White, Marshall, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter	60	2505	4192	83	O'Connor	Souter	39	Stevens	Scalia	120
1991	Rehnquist 4	White, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas	55	2119	3864	72	Kennedy	Souter	32	Blackmun	Scalia	114
1992	Rehnquist 4	White, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas	63	2566	4104	82	Rehnquist	Kennedy	44	Stevens	Thomas	114
1993	Rehnquist 5	Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg	59	1830	3108	72	Rehnquist	O'Connor	38	Blackmun	Thomas	87
1994	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	64	1947	3041	80	Rehnquist	Kennedy	41	Stevens	Thomas	86
1995	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	64	1813	2820	78	O'Connor	Kennedy	43	Stevens	Thomas	75
1996	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	65	2002	3088	83	Rehnquist	Kennedy	44	Stevens Stevens	Scalia Thomas	86
1997	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	68	2261	3340	85	Rehnquist	Kennedy	47	Stevens	Scalia	93
1998	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	59	1703	2900	76	Rehnquist O'Connor	O'Connor Kennedy	37	Stevens	Thomas	81
1999	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	60	1652	2772	86	Rehnquist	O'Connor	40	Stevens	Scalia	77
2000	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	61	1859	3057	81	Rehnquist	Kennedy	40	Stevens	Scalia	86

2001	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	58	1665	2868	77	Rehnquist	Kennedy	37	Souter	Thomas	81
2002	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	63	1765	2784	79	Rehnquist	Kennedy	44	Stevens	Thomas	78
2003	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	59	1682	2833	78	Rehnquist	O'Connor	39	Stevens	Scalia	80
2004	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	59	1629	2756	73	O'Connor	Kennedy	41	Stevens Thomas	Thomas Ginsburg	79
2005	Roberts 1 & 2	Stevens, O'Connor (24), Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer, Roberts, Alito (40)	70	1914	2749	96	O'Connor	Souter	45	Stevens	Alito	81

Chart 1 – Supreme Court Aggregate Agreement by Term (1956-2005)

(Harvard Law Review O Method)
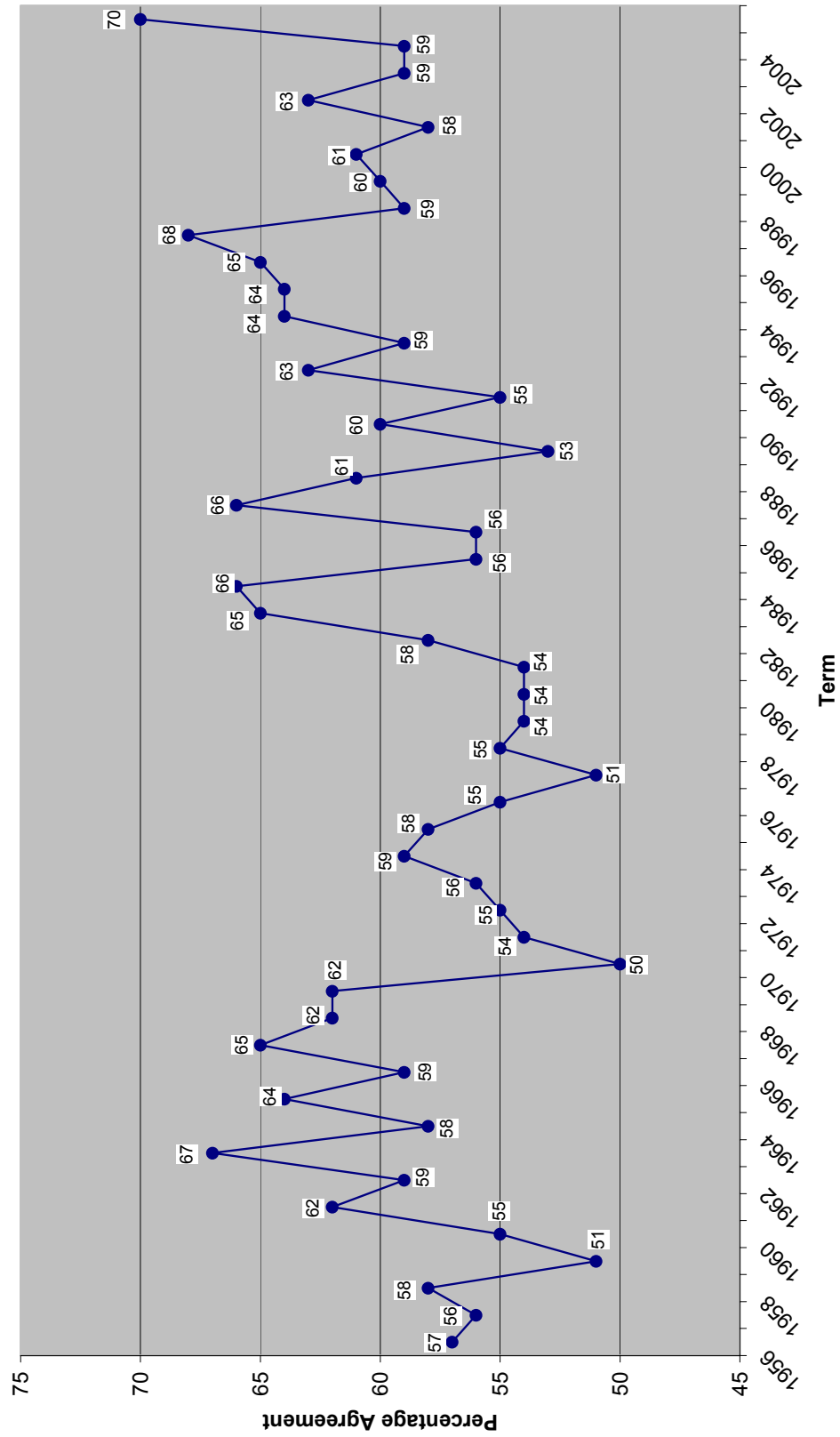
Chart 2-- Supreme Court Aggregate Agreement by Term (1956-2005) 5 Year Bins (Harvard Law Review O Method)
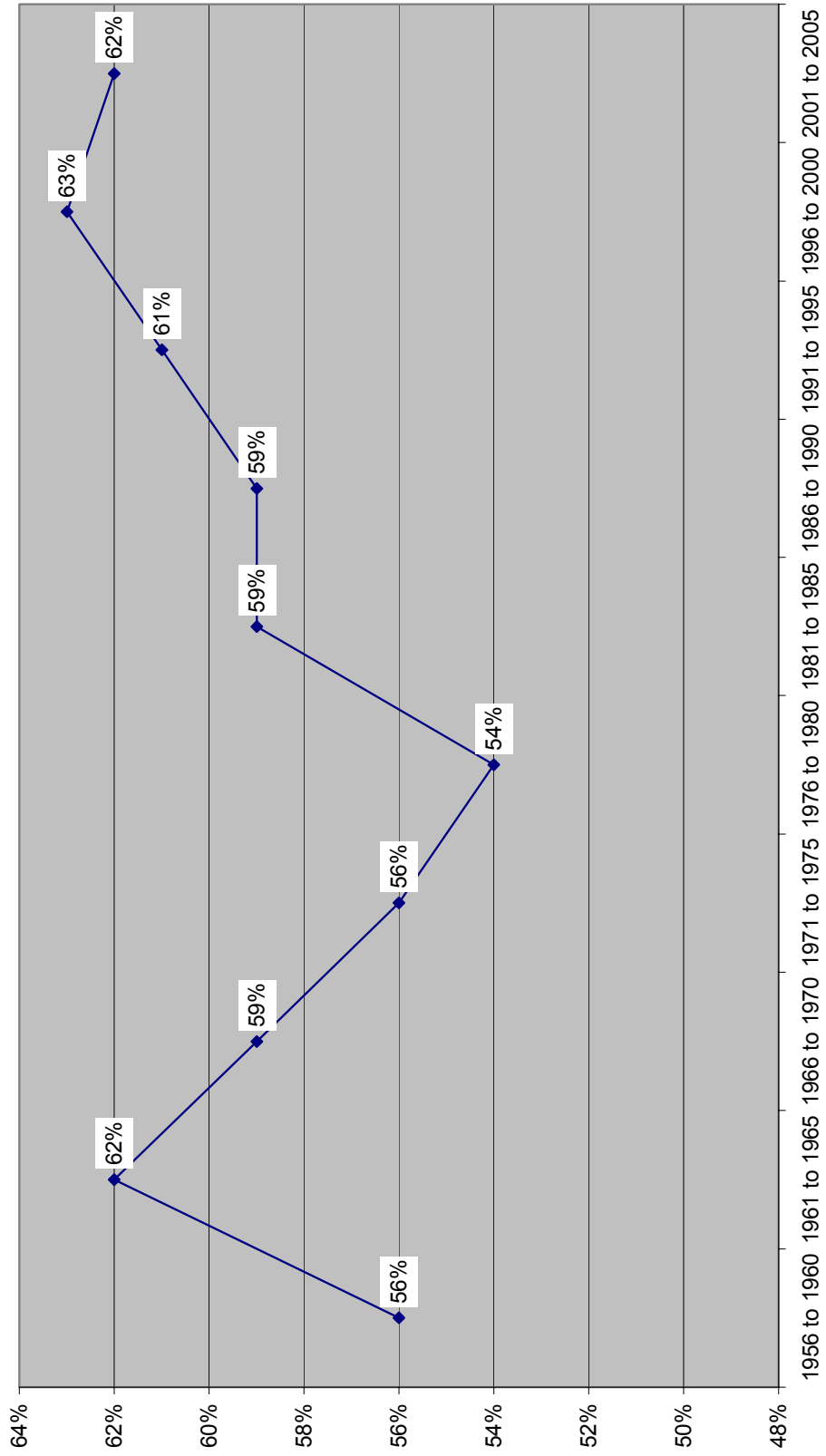
Table 2 – Aggregated Percentage Voting Agreement Between Supreme Court Justices (1956-2005 Terms)
(Using O and N data from the *Harvard Law Review* (ΣO / ΣN))

		1 Black	2 Reed	3 Frankfurter	4 Douglas	5 Burton	6 Clark	7 Warren	8 Harlan	9 Brennan	10 Whittaker	11 Stewart	12 White	13 Goldberg	14 Fortas	15 Marshall	16 Burger	17 Blackmun	18 Rehnquist	19 Powell	20 Stevens	21 O'Connor	22 Scalia	23 Kennedy	24 Souter	25 Thomas	26 Ginsburg	27 Breyer	28 Roberts	29 Alito
1	Black		56	43	56	45	59	68	41	63	47	49	58	61	59	53	52	53												
2	Reed	56		51	62	69	85	71	57	68																				
3	Frankfurter	43	51		38	55	60	46	60	54	59	60																		
4	Douglas	56	62	38		41	54	66	39	60	42	46	51	60	66	52	35	36	28	37										
5	Burton	45	69	55	41		63	50	58	58	65																			
6	Clark	59	85	60	54	63		68	55	71	66	64	71	60	69															
7	Warren	68	71	46	66	50	68		49	82	53	61	75	76	80	88														
8	Harlan	41	57	60	39	58	55	49		53	58	56	53	43	50	56	58	53												
9	Brennan	63	68	54	60	58	71	82	53		57	57	59	77	79	61	47	54	42	51	52	51	46	51						
10	Whittaker	47		59	42	65	66	53	58	57		64																		
11	Stewart	49		60	46		64	61	56	57	64		62	61	58	54	63	61	61	68	57									
12	White	58			51		71	75	53	59		62		66	67	54	69	64	68	70	56	71	67	74	70	63				
13	Goldberg	61			60		60	76	43	77		61	66																	
14	Fortas	59			66		69	80	50	79		58	67			85														
15	Marshall	53			52			88	56	61		54	54		85		46	53	41	50	50	47	43	48	54					
16	Burger	52			35				58	47		63	69			46		66	70	72	53	76								
17	Blackmun	53			36				53	54		61	64			53	66		58	66	54	58	49	55	57	42	58			
18	Rehnquist				28					42		61	68			41	70	58		69	51	74	69	77	65	68	61	61		
19	Powell				37					51		68	70			50	72	66	69		55	74	70							
20	Stevens									52		57	56			50	53	54	51	55		55	46	56	60	44	63	61	65	45
21	O'Connor									51			71			47	76	58	74	74	55		66	75	69	65	65	68	91	
22	Scalia									46			67			43		49	69	70	46	66		69	57	67	54	52	82	70
23	Kennedy									51			74			48		55	77		56	75	69		69	67	65	65	79	70
24	Souter												70			54		57	65		60	69	57	69		54	70	69	74	58
25	Thomas												63					42	68		44	65	67	67	54		51	51	78	70
26	Ginsburg																	58	61		63	65	54	65	70	51		68	73	55
27	Breyer																		61		61	68	52	65	69	51	68		74	50
28	Roberts																				65	91	82	79	74	78	73	74		82
29	Alito																				45		70	70	58	70	55	50	82	

Table3: Statistics about the 50 Aggregate Harmony Metric Values
(1956 – 2005 Terms)
(Calculated from O & N data from the *Harvard Law Review*)

Range of Aggregate Harmony Values	50% to 70%
Mean of Aggregate Harmony Values	59.16%
Median of Aggregate Harmony Values	59%
Mode of Aggregate Harmony Values	59% (7 Occurrences)
1st Quartile	0% to 55.25%
2nd Quartile	55.26% to 59.16
3rd Quartile	59.16% to 62.75%
4th Quartile	62.76% to 100%

Table 4 – Aggregate Co-Voting Statistics for the United States Supreme Court by Chief Justice Tenure (1956-2005 Terms)

Court	Aggregate Percentage Agreement (O Method)	Cumulative O Count	Cumulative N Count	Highest Percentage Agreement (O Method)	Highest Percentage Agreement Justice 1	Highest Percentage Agreement Justice 2	Lowest Percentage Agreement (O Method)	Lowest Percentage Agreement Justice 1	Lowest Percentage Agreement Justice 2	"Full Opinions"
Warren (1956 to 1968)	59	28,972	48,737	90	Brennan	Marshall	38	Frankfurter Douglas	Douglas Harlan	1485
Burger (1969 to 1985)	57	47,500	83,923	76	Burger	O'Connor	28	Douglas	Rehnquist	2488
Rehnquist (1986 to 2004)	60	40,620	67,343	77	Rehnquist Rehnquist	Powell Kennedy	42	Blackmun	Thomas	1913
Roberts (2005)	70	1914	2749	96	O'Connor	Souter	45	Stevens	Alito	81

Table 5 – Aggregate Co-Voting Statistics for the United States Supreme Court
5 Year Bins (1956-2005 Terms)

Term	Court	Aggregate Percentage Agreement (O Method)	Cumulative O Count	Cumulative N Count	Average Yearly No. of "Full Opinions"
1956 to 1960	Warren	56	10,761	19,385	114
1961 to 1965	Warren	62	10,786	17,390	110
1966 to 1970	Warren / Burger	59	11,101	18,715	117
1971 to 1975	Burger	56	14,214	25,166	154
1976 to 1980	Burger	54	12,984	24,053	140
1981 to 1985	Burger	59	16,626	27,951	160
1986 to 1990	Rehnquist	59	14,127	24,008	139
1991 to 1995	Rehnquist	61	10,275	16,937	95
1996 to 2000	Rehnquist	63	9477	15,157	85
2001 to 2005	Rehnquist / Roberts	62	8655	13990	80

Chart 3 – Justices of the United States Supreme Court
(1956 – 2005 Terms)
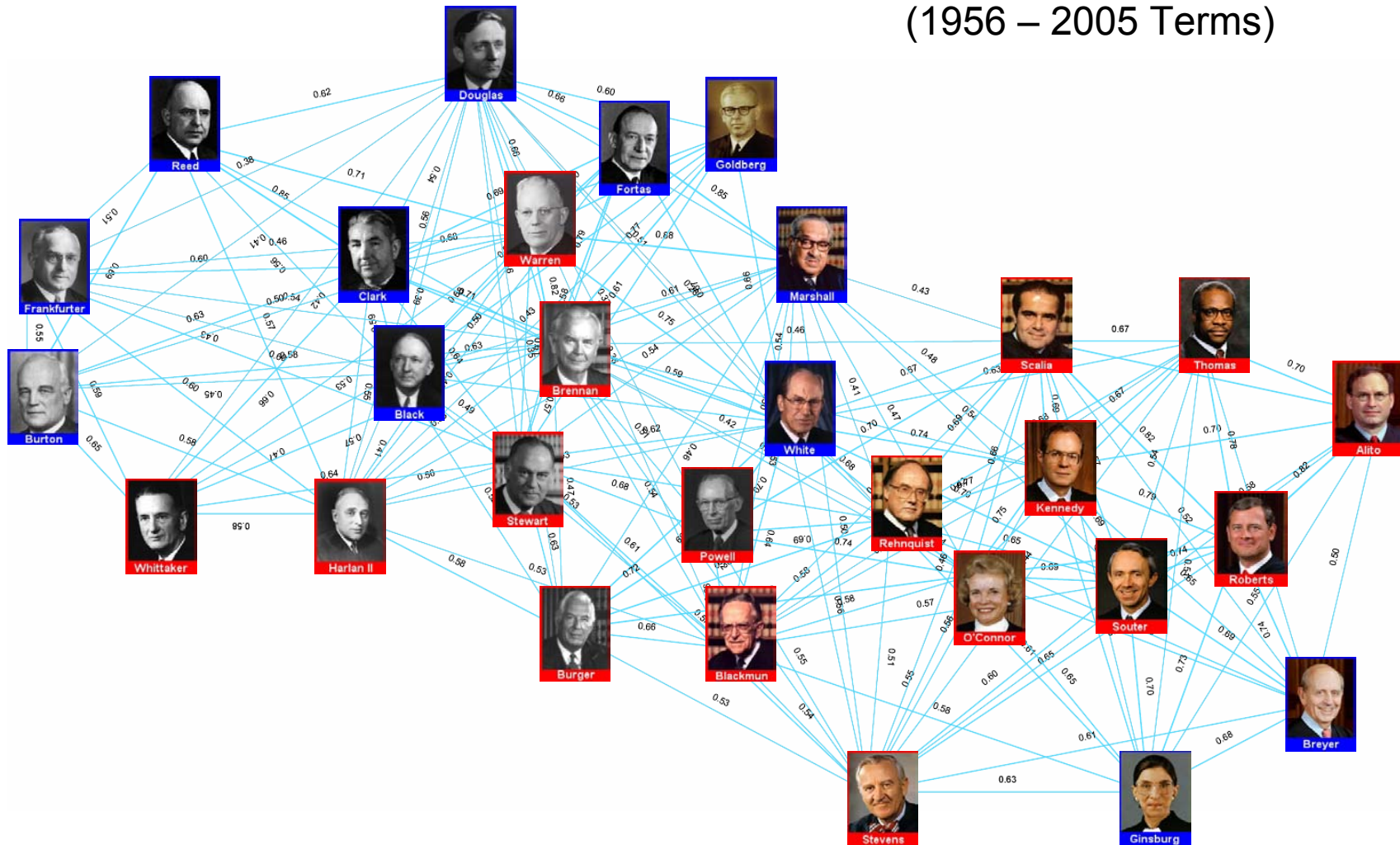
© 2007 Peter A. Hook – Spatial distribution based on the percentage of co-voting in Supreme Court opinions. Source: Harvard Law Review (O Data). Rendered with Pajek. Blue border color = appointed by a Democrat. Red border color = appointed by a Republican.

Chart 4

1994-2003 Non-Unanimous Cases (MDS using R)

John Paul Stevens

Clarence Thomas

Antonin Scalia

Ruth Bader Ginsburg

David Hacktt Souter

Anthony M. Kennedy

William H. Rehnquist

Stephen G. Breyer

Sandra Day O'Connor

Dimension 2

Dimension 1
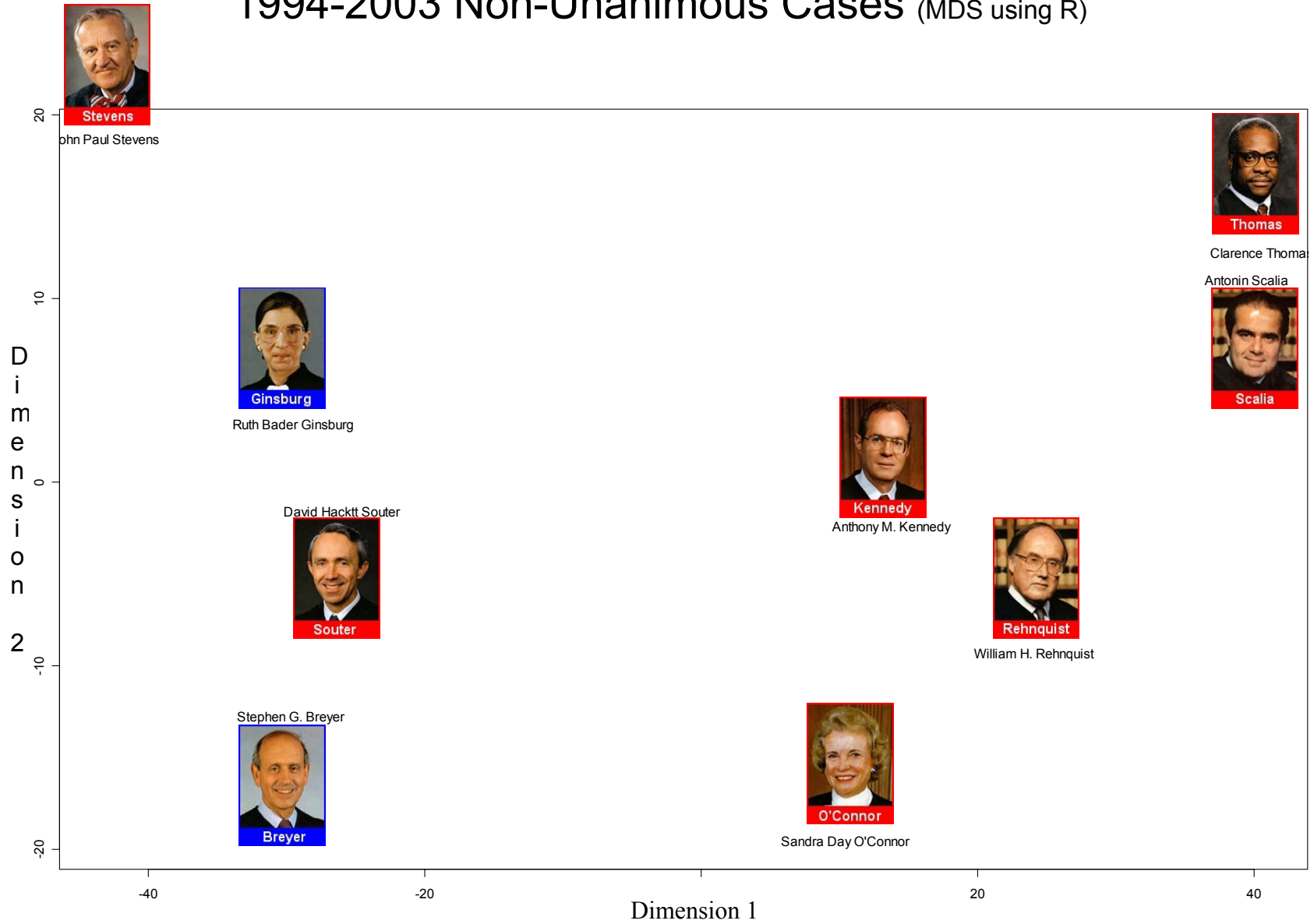
Chart 5

1994-2003 Freedom of Speech Cases (MDS using R, O method)

William H. Rehnquist
Rehnquist

Sandra Day O'Connor
O'Connor

Stephen G. Breyer
Breyer

Souter
David Hacktt Souter

Stevens
John Paul Stevens

Ruth Bader Ginsburg
Ginsburg

Scalia
Antonin Scalia

Kennedy
Anthony M. Kennedy

Clarence Thomas
Thomas

Dimension 2

Dimension 1
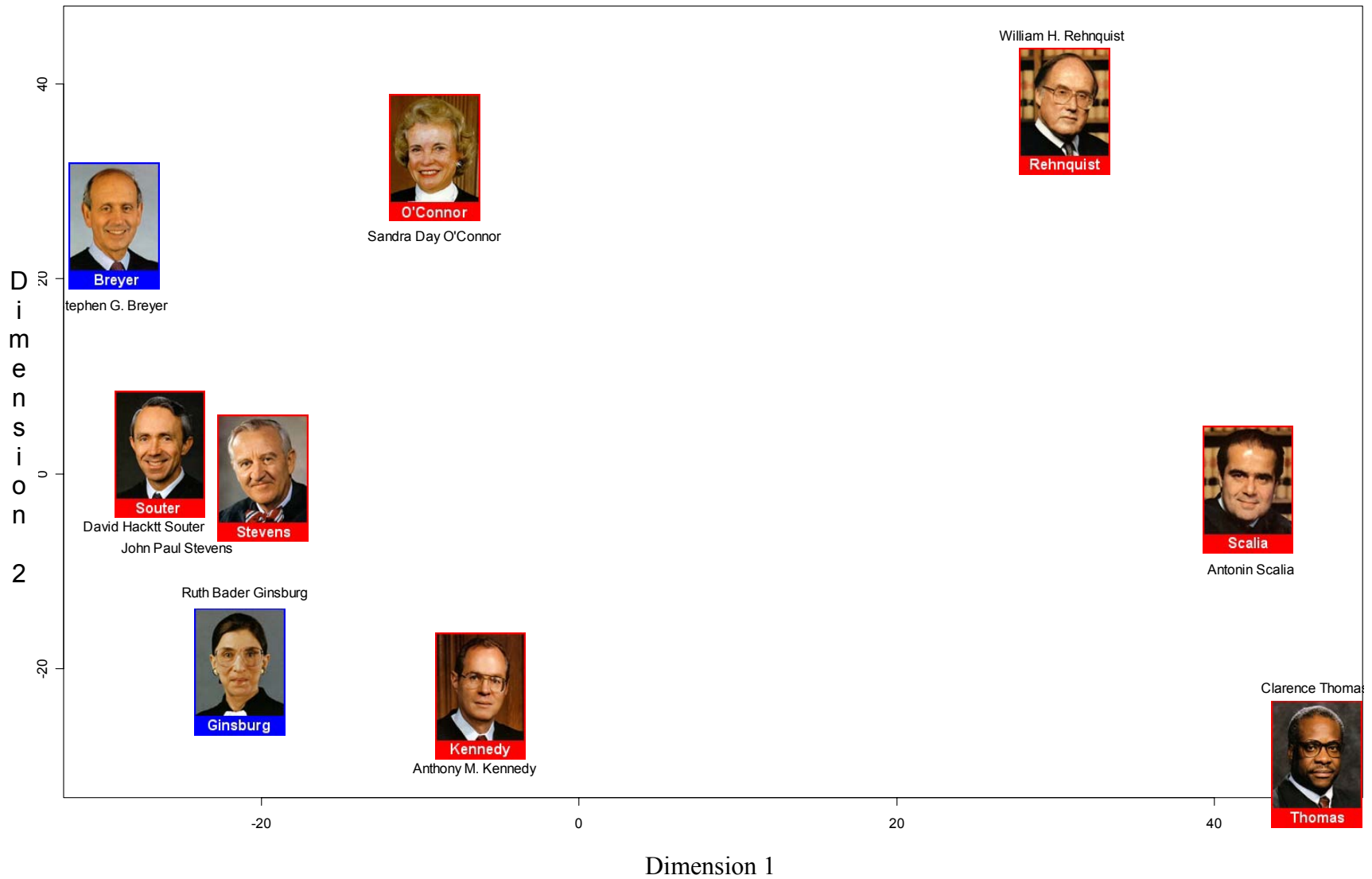
Chart 6

Frequency of Voting Blocks in 5-4 Cases
(1994 -2003 Supreme Court Terms)

Stevens | Breyer | Ginsburg | Souter   O'Connor | Kennedy | Rehnquist | Scalia | Thomas   82   175   **47%**

Stevens | Breyer | Ginsburg | Souter | O'Connor   Kennedy | Rehnquist | Scalia | Thomas   28   175   **16%**

Stevens | Breyer | Ginsburg | Souter | Kennedy   O'Connor | Rehnquist | Scalia | Thomas   14   175   **8%**
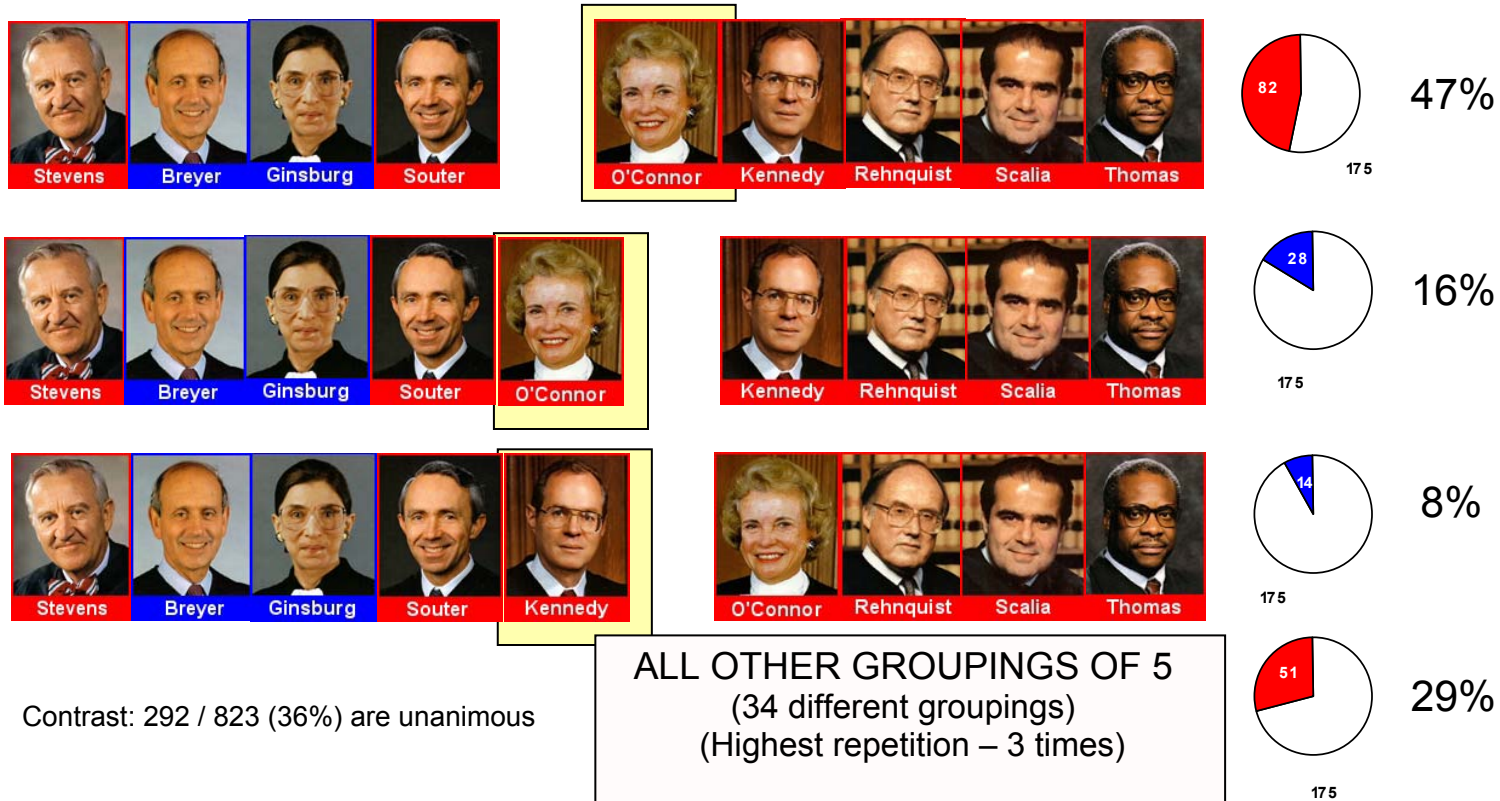
Contrast: 292 / 823 (36%) are unanimous

ALL OTHER GROUPINGS OF 5
(34 different groupings)
(Highest repetition – 3 times)   51   175   **29%**

Total 5 to 4 Cases = 175

(Out of 823 total)

Chart 7

Thresholding (Voting Together > 50%) Reveals Ideological Cliques
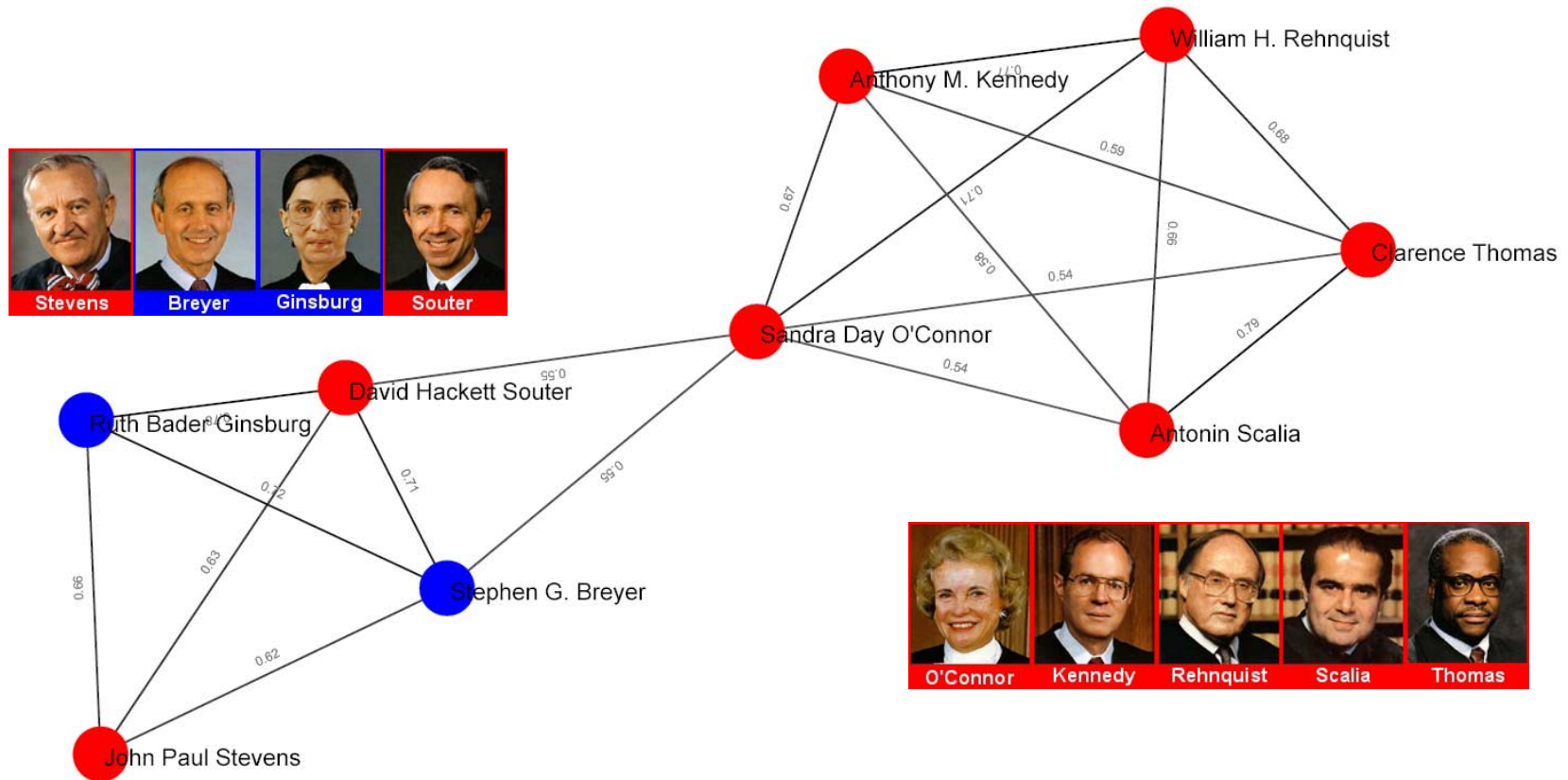
Appointed by a Democrat

Appointed by a Republican

Voting frequencies represented as the edge weight between nodes and presented visually as a graph. (Rendered with Pajek using a stochastic, spring force algorithm.)

Chart 8

Thresholding (Voting Together > 49%) Reveals Ideological Cliques
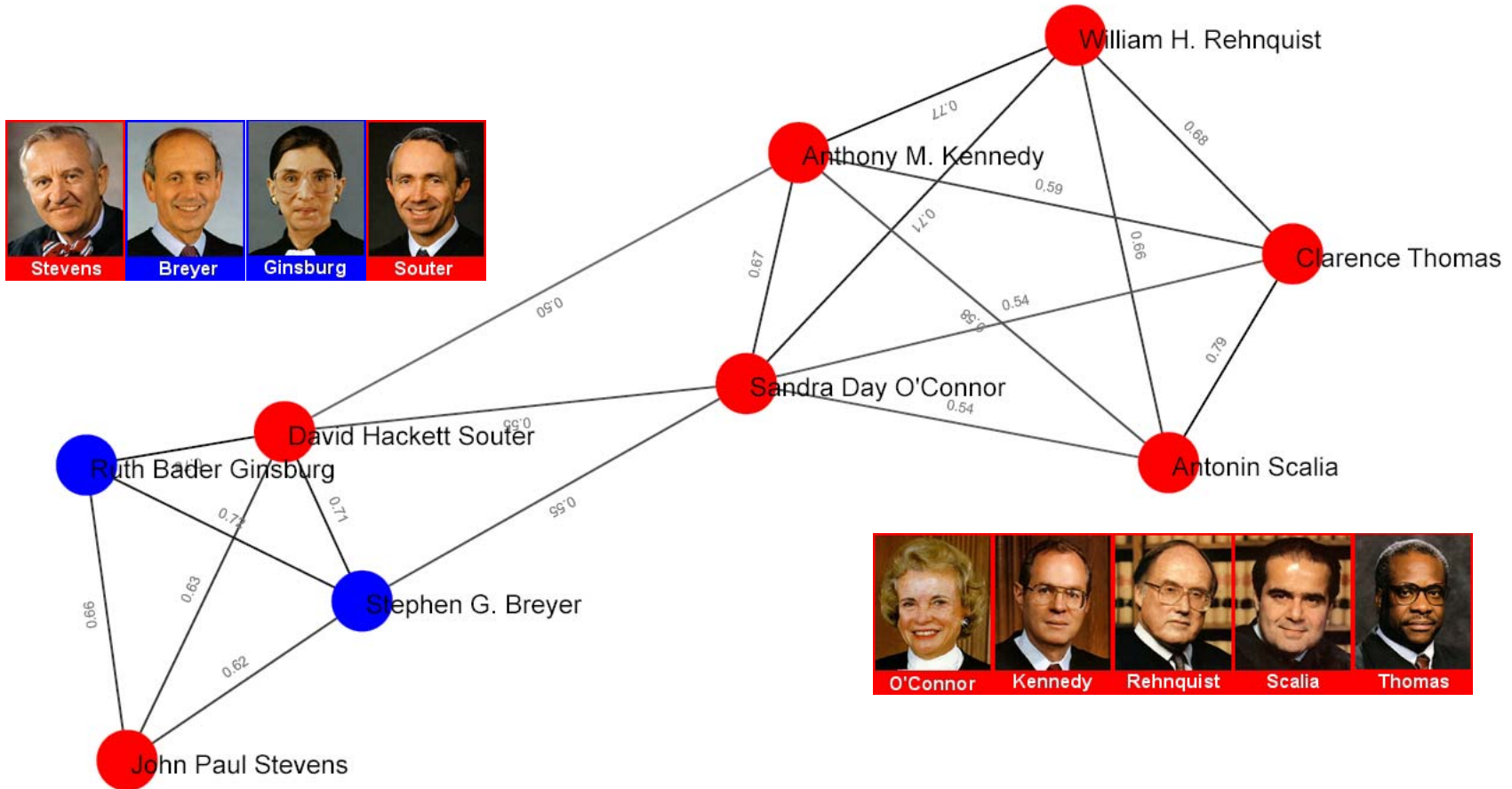
Appointed by a Democrat

Appointed by a Republican

Voting frequencies represented as the edge weight between nodes and presented visually as a graph. (Rendered with Pajek using a stochastic, spring force algorithm.)

Table 6: 25 Highest Co-Voting Percentages
Over 50 Years (1956 – 2005 Terms)
(Calculated from O & N data from the Harvard Law Review)

Rank	Justice 1	Justice 2	Percentage	Number of Cases Heard Together
1	O'Connor	Roberts	91	23
2	Warren	Marshall	88	178
3	Reed	Clark	85	40
3	Fortas	Marshall	85	132
5	Warren	Brennan	82	1406
5	Scalia	Roberts	82	78
5	Roberts	Alito	82	39
8	Warren	Fortas	80	391
9	Kennedy	Roberts	79	78
9	Brennan	Fortas	79	394
11	Thomas	Roberts	78	77
12	Brennan	Goldberg	77	308
12	Rehnquist	Kennedy	77	1670
14	Burger	O'Connor	76	790
14	Warren	Goldberg	76	308
16	Warren	White	75	770
16	O'Connor	Kennedy	75	1685
18	Souter	Roberts	74	78
18	Breyer	Roberts	74	78
18	Powell	O'Connor	74	888
18	Rehnquist	O'Connor	74	2669
18	White	Kennedy	74	688
23	Ginsburg	Roberts	73	78
24	Burger	Powell	72	2070
25	Reed	Warren	71	42
25	White	O'Connor	71	1694
25	Clark	Brennan	71	1169
25	Clark	White	71	537

Table 7: 25 Highest Co-Voting Percentages
Over 50 Years (1956 – 2005 Terms)
of Justices Deciding 100 or More Cases Together
(Calculated from O & N data from the Harvard Law Review)

Rank	Justice 1	Justice 2	Percentage	Number of Cases Heard Together
1	Warren	Marshall	88	178
2	Fortas	Marshall	85	132
3	Warren	Brennan	82	1406
4	Warren	Fortas	80	391
5	Brennan	Fortas	79	394
6	Brennan	Goldberg	77	308
6	Rehnquist	Kennedy	77	1670
8	Burger	O'Connor	76	790
8	Warren	Goldberg	76	308
10	Warren	White	75	770
10	O'Connor	Kennedy	75	1685
12	Powell	O'Connor	74	888
12	Rehnquist	O'Connor	74	2669
12	White	Kennedy	74	688
15	Burger	Powell	72	2070
16	White	O'Connor	71	1694
16	Clark	Brennan	71	1169
16	Clark	White	71	537
19	White	Souter	70	335
19	Souter	Ginsburg	70	1071
19	Burger	Rehnquist	70	2166
19	Powell	Scalia	70	147
19	White	Powell	70	2215
24	O'Connor	Souter	69	1337
24	Scalia	Kennedy	69	1758
24	Souter	Breyer	69	976
24	Rehnquist	Scalia	69	1892
24	Rehnquist	Powell	69	2200
24	White	Burger	69	2464
24	Clark	Fortas	69	195
24	Kennedy	Souter	69	1404

Table 8: 25 Lowest Co-Voting Percentages
Over 50 Years (1956 – 2005 Terms)
(Calculated from O & N data from the Harvard Law Review)

Rank	Justice 1	Justice 2	Percentage	Number of Cases Heard Together
1	Douglas	Rehnquist	28	513
2	Douglas	Burger	35	792
3	Douglas	Blackmun	36	695
4	Douglas	Powell	37	495
5	Frankfurter	Douglas	38	588
6	Douglas	Harlan II	39	1633
7	Marshall	Rehnquist	41	2819
7	Douglas	Burton	41	231
7	Black	Harlan II	41	1628
10	Blackmun	Thomas	42	284
10	Brennan	Rehnquist	42	2706
10	Douglas	Whittaker	42	523
13	Black	Frankfurter	43	576
13	Marshall	Scalia	43	685
13	Harlan II	Goldberg	43	308
16	Stevens	Thomas	44	1266
17	Stevens	Alito	45	40
17	Black	Burton	45	222
19	Douglas	Stewart	46	1963
19	Frankfurter	Warren	46	587
19	Brennan	Scalia	46	565
19	Stevens	Scalia	46	1978
19	Marshall	Burger	46	2424
24	Black	Whittaker	47	515
24	Brennan	Burger	47	2440
24	Marshall	O'Connor	47	1462
27	Marshall	Kennedy	48	460

Table 9: 25 Most Cases Heard Together
Over 50 Years (1956 – 2005 Terms)
(Calculated from N data from the Harvard Law Review)

Rank	Justice 1	Justice 2	Percentage	Number of Cases Heard Together
1	Brennan	White	59	3786
2	Rehnquist	Stevens	51	3432
3	White	Marshall	54	3285
4	White	Blackmun	64	3257
5	Brennan	Marshall	61	3140
6	Blackmun	Rehnquist	58	3137
7	White	Rehnquist	68	3078
8	Marshall	Blackmun	53	3005
9	Brennan	Blackmun	54	2884
10	Marshall	Rehnquist	41	2819
11	Brennan	Stewart	57	2812
12	Brennan	Rehnquist	42	2706
13	Stevens	O'Connor	55	2696
14	Rehnquist	O'Connor	74	2669
15	Blackmun	Stevens	54	2536
16	White	Stevens	56	2472
17	White	Burger	69	2464
18	Brennan	Burger	47	2440
19	Stewart	White	62	2428
20	Marshall	Burger	46	2424
21	Burger	Blackmun	66	2349
22	Marshall	Stevens	50	2219
23	White	Powell	70	2215
24	Douglas	Brennan	60	2213
25	Rehnquist	Powell	69	2200

Table 10: Statistics about the 193 Justice Pairings over the 50 Years of the Dataset
(1956 – 2005 Terms)
(Calculated from O & N data from the Harvard Law Review)

Total Number of Possible Justice Pairings	193
Range Of Co-Voting Percentages	28% to 91%
Mean of Co-Voting Percentages	59.93%
Median of Co-Voting Percentages	60%
Mode of Co-Voting Percentages	58% (10 Occurrences)
1st Quartile	0% to 53%
2nd Quartile	53.01% to 59.93%
3rd Quartile	59.94% to 68%
4th Quartile	68.01% to 100%

Chart 9

Histogram of Percentages of Co-Voting, O Method