

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 fiftieth 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 matrices include both raw numbers and

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1. See *The Supreme Court, 2005 Term*, 120 HARV. L. REV. 372, 372-84 (2006).

2. The *Harvard Law Review* first published the annual matrix in 1957 (regarding the 1956 Term), and has provided annual matrices ever since. See *The Supreme Court, 1956 Term*, 71 HARV. L. REV. 84, 103 (1957); *The Supreme Court, 1957 Term*, 72 HARV. L. REV. 96, 103 (1958); *The Supreme Court, 1958 Term*, 73 HARV. L. REV. 128, 133 (1959); *The Supreme Court, 1959 Term*, 74 HARV. L. REV. 95, 105 (1960); *The Supreme Court, 1960 Term*, 75 HARV. L. REV. 80, 89 (1961); *The Supreme Court, 1961 Term*, 76 HARV. L. REV. 75, 85 (1962); *The Supreme Court, 1962 Term*, 77 HARV. L. REV. 79, 87 (1963); *The Supreme Court, 1963 Term*, 78 HARV. L. REV. 177, 183 (1964); *The Supreme Court, 1964 Term*, 79 HARV. L. REV. 103, 109 (1965); *The Supreme Court, 1965 Term*, 80 HARV. L. REV. 123, 145 (1966); *The Supreme Court, 1966 Term*, 81 HARV. L. REV. 110, 131 (1967); *The Supreme Court, 1967 Term*, 82 HARV. L. REV. 93, 307 (1968); *The Supreme Court, 1968 Term*, 83 HARV. L. REV. 60, 279 (1969); *The Supreme Court, 1969 Term*, 84 HARV. L. REV. 30, 252 (1970); *The Supreme Court, 1970 Term*, 85 HARV. L. REV. 38, 351 (1971); *The Supreme Court, 1971 Term*, 86 HARV. L. REV. 50, 301 (1972); *The Supreme Court, 1972 Term*, 87 HARV. L. REV. 55, 304 (1973); *The Supreme Court, 1973 Term*, 88 HARV. L. REV. 41, 275 (1974); *The Supreme Court, 1974 Term*, 89 HARV.

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 fifty-year span allows for some important insights and benchmarks as to the last half century of the Supreme Court—the 1956 to 2005 Terms. Given how often these or similar statistics are cited,⁴ emulated,⁵ compiled and/or reproduced,⁶ the aggregated, longi-

L. REV. 47, 276 (1975); *The Supreme Court, 1975 Term*, 90 HARV. L. REV. 56, 277 (1976); *The Supreme Court, 1976 Term*, 91 HARV. L. REV. 70, 296 (1977); *The Supreme Court, 1977 Term*, 92 HARV. L. REV. 57, 328 (1978); *The Supreme Court, 1978 Term*, 93 HARV. L. REV. 60, 276 (1979); *The Supreme Court, 1979 Term*, 94 HARV. L. REV. 75, 290 (1980); *The Supreme Court, 1980 Term*, 95 HARV. L. REV. 91, 340 (1981); *The Supreme Court, 1981 Term*, 96 HARV. L. REV. 62, 305 (1982); *The Supreme Court, 1982 Term*, 97 HARV. L. REV. 70, 296 (1983); *The Supreme Court, 1983 Term*, 98 HARV. L. REV. 87, 308 (1984); *The Supreme Court, 1984 Term*, 99 HARV. L. REV. 120, 323 (1985); *The Supreme Court, 1985 Term*, 100 HARV. L. REV. 100, 305 (1986); *The Supreme Court, 1986 Term*, 101 HARV. L. REV. 119, 363 (1987); *The Supreme Court, 1987 Term*, 102 HARV. L. REV. 143, 351 (1988); *The Supreme Court, 1988 Term*, 103 HARV. L. REV. 137, 395 (1989); *The Supreme Court, 1989 Term*, 104 HARV. L. REV. 129, 360 (1990); *The Supreme Court, 1990 Term*, 105 HARV. L. REV. 177, 420 (1991); *The Supreme Court, 1991 Term*, 106 HARV. L. REV. 163, 379 (1992); *The Supreme Court, 1992 Term*, 107 HARV. L. REV. 144, 373 (1993); *The Supreme Court, 1993 Term*, 108 HARV. L. REV. 139, 373 (1994); *The Supreme Court, 1994 Term*, 109 HARV. L. REV. 111, 341 (1995); *The Supreme Court, 1995 Term*, 110 HARV. L. REV. 135, 368 (1996); *The Supreme Court, 1996 Term*, 111 HARV. L. REV. 197, 432 (1997); *The Supreme Court, 1997 Term*, 112 HARV. L. REV. 122, 367 (1998); *The Supreme Court, 1998 Term*, 113 HARV. L. REV. 400, 401 (1999); *The Supreme Court, 1999 Term—The Statistics*, 114 HARV. L. REV. 179, 391 (2000); *The Supreme Court, 2000 Term*, 115 HARV. L. REV. 539, 540 (2001); *The Supreme Court, 2001 Term*, 116 HARV. L. REV. 453, 454 (2002); *The Supreme Court, 2002 Term*, 117 HARV. L. REV. 480, 481 (2003); *The Supreme Court, 2003 Term*, 118 HARV. L. REV. 497, 499 (2004); *The Supreme Court, 2004 Term*, 119 HARV. L. REV. 415, 421 (2005); *The Supreme Court, 2005 Term*, 120 HARV. L. REV. 372, 374 (2006). Hereinafter, each of the annual articles will be cited as follows: *The [year] Term*. For example, the issue addressing the 2005 Term will be cited as *The 2005 Term*.

3. See *supra* note 2.

4. See, e.g., Paul Butler, *Rehnquist, Racism, and Race Jurisprudence*, 74 GEO. WASH. L. REV. 1019, 1030 (2006); Walter E. Joyce, *The Early Constitutional Jurisprudence of Justice Stephen G. Breyer: A Study of the Justice's First Year on the United States Supreme Court*, 7 SETON HALL CONST. L.J. 149, 161; Michael Stokes Paulsen, *Counting Heads on RFRA*, 14 CONST. COMMENT. 7, 12 (1997); Kevin H. Smith, *Certiorari and the Supreme Court Agenda: An Empirical Analysis*, 54 OKLA. L. REV. 727, 728 (2001); Stephen J. Wermiel, *Clarence Thomas After Ten Years: Some Reflections*, 10 AM. U.J. GENDER SOC. POL'Y & L. 315, 316 (2002).

5. See Mark Tushnet, *Taking Sides: Many Believe Political Differences Rend the Rehnquist Court. But More Than Politics Are in Play*, LEGAL AFFAIRS, Mar.-Apr. 2005, at 38, 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 the Indiana Supreme Court: the *Indiana Law Review* has covered the voting patterns of the justices on the Indiana Supreme Court since its 1991 term. See, e.g., Mark J. Crandley et al., *An Examination of the Indiana Supreme Court Docket, Dispositions, and Voting in 2005*, 39 IND. L. REV. 733 (2006); 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. See Christine

tudinal data should be of interest to scholars, commentators, law students, and the public at large.

Furthermore, these aggregated matrices 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 fifty-year perspective also allows schol-

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); Stephen R. Barnett, Forward, *The Emerging Court*, 71 CAL. L. REV. 1134, 1193 (1983); Nathan J. Kunz et al., Note, *Colorado Supreme Court Statistical Survey*, 83 DENV. U. L. REV. 605 (2005); 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. 1547 (1999); 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); *Annual Review of Maryland Law: Court of Appeals of Maryland, 1995-96 Opinions*, 26 (1) U. BALT. L. REV. 1 (1996); Robert A. Marangola, Note, *Independent State Constitutional Adjudication in Massachusetts: 1988-1998*, 61 ALB. L. REV. 1625, 1675 (1998); Luke Bierman, *The Dynamics of State Constitutional Decision-Making: Judicial Behavior at the New York Court of Appeals*, 68 TEMP. L. REV. 1403 (1995); Vincent Martin Bonventre, *Court of Appeals—State Constitutional Law Review, 1990*, 12 PACE L. REV. 1 (1992) (discussing the New York Court of Appeals); Harry C. Martin, *Statistical Compilation of the Opinions of the Supreme Court of North Carolina Terms 1989-90 Through 1992-93*, 72 N.C. L. REV. 1453 (1994); 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); 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); James E. Bond & Kelly Kunsch, *A State Supreme Court in Transition*, 25 SEATTLE U. L. REV. 545 (2002) (discussing the Washington Supreme Court).

There is at least one study as to the voting alignment of a particular Federal Court of Appeals. Harry T. Edwards, *Public Misperceptions Concerning the "Politics" of Judging: Dispelling Some Myths About the D.C. Circuit*, 56 U. COLO. L. REV. 619, 644 (1985) (DC Circuit).

There is also at least one study on intermediate state appellate courts. See 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 star (*) footnote of this work cites several previous Maryland studies, including William L. Reynolds, II, *The Court of Appeals of Maryland: Roles, Work and Performance—Part I*, 37 MD. L. REV. 1, 40-56 (1977) (September 1975 Term) and others.).

6. See 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 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, 1346-52 (1992); Linda Greenhouse, *Court in Transition: News Analysis; Consistently, A Pivotal Role*, N.Y. TIMES, July 2, 2005, at A1 (including a 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 1 (including a chart titled, "Percentage of Times That Pairs of Justices Agreed in Nonunanimous Decisions in the 2005-06 Term").

ars 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.⁷ At least one scholar has described this as a “quiet term.”⁸ 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 matrices appears⁹ to be the work of C. Herman Pritchett in 1941.¹⁰ Pritchett’s 1941 article contains a matrix of percentage agreement among the Justices in controversial cases during the 1939 and 1940 Terms.¹¹ 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)),¹² Pritchett produced a lengthier treatment of the subject in a 1948 book.¹³ Table XXII of this work consists of matrices of percentage agreements for all members of the Court for all non-unanimous opinions of the Court for the 1931 through 1946 Terms.¹⁴ A subsequent work by Pritchett contains matrices of percentage agreements for all members of the court for non-unanimous opinions of the Court for the 1946-1948 Terms (Table 5)¹⁵ and the 1949-1952 Terms (Table 7).¹⁶

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

7. See *infra* Table 1 and Chart 1.

8. See Frederick Schauer. Forward, *The Court's Agenda—and the Nation's*. 120 HARV L. REV. 4, 32 (2006).

9. See J. Woodford Howard, Jr., Commentary, 70 N.Y.U. L. REV. 533, 543 (1995).

10. 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 Lee Epstein et al., *The Political (Science) Context of Judging*, 47 ST. LOUIS U. L.J. 783, 786 (2003); G. Edward White, *Unpacking the Idea of the Judicial Center*, 83 N.C. L. REV. 1089 (2005).

11. Pritchett, *supra* note 10, at 894 tbl. III.

12. C. Herman Pritchett, *The Voting Behavior of the Supreme Court, 1941-42*, 4 J. POL. 491, 497 tbl. III (1942).

13. C. HERMAN PRITCHETT, *THE ROOSEVELT COURT: A STUDY IN JUDICIAL POLITICS AND VALUES 1937-1947* (1948).

14. *Id.* at 240-48.

15. C. HERMAN PRITCHETT, *CIVIL LIBERTIES AND THE VINSON COURT* 182 (1954).

16. *Id.* at 184.

of the Court. John Sprague published voting alignment data for as early as 1916.¹⁷ At least as early as for the 1995 term, *United States Law Week* has published voting alignment matrices.¹⁸ In addition, *The National Law Journal* also publishes voting alignment data.¹⁹

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.²⁰ Similar data is published in the wonderfully detailed book, *The Supreme Court Compendium: Data, Decisions & Developments*.²¹ 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.²² The data for these tables comes from a freely available database known as the *U.S. Supreme Court Judicial Database*.²³

The U.S. Supreme Court Judicial Database was created by political scientist, Harold J. Spaeth,²⁴ and is widely used by the political science community. The database has been cited by law school scholars, and some note its discrepancies²⁵ with the *Har-*

17. JOHN D. SPRAGUE, *VOTING PATTERNS OF THE UNITED STATES SUPREME COURT: CASES IN FEDERALISM, 1889-1959* (1968).

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

19. Marcia Coyle, *An Activist Court Rules on Speech, Immigration and One Big Election*, *NAT'L L.J.*, Aug. 6, 2001, at C1 (including table titled "Voting Alignments on the Supreme Court"); Marcia Coyle, *New Trio Stands Up to Court's Hard Right*, *NAT'L L.J.*, Aug. 31, 1992, at S1 (including table titled "Voting Alignments on the Supreme Court: 1991-92 Term").

20. Robert E. Riggs, *Supreme 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).

21. LEE EPSTEIN ET AL., *THE SUPREME COURT COMPENDIUM: DATA, DECISIONS & DEVELOPMENTS* (3d ed. 2003).

22. *Id.* at 524-87 (including tables for the Vinson Court, 1946-1952 Terms (Table 6-4); the Warren Court, 1953-1968 Terms (Table 6-5); the Burger Court, 1969-1985 Terms (Table 6-6); and the Rehnquist Court, 1986-2001 Terms (Table 6-7)).

23. The S. Sidney Ulmer Project: U.S. Supreme Court Databases. <http://www.as.uky.edu/polisci/ulmerproject/sctdata.htm>.

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

25. 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

vard 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.²⁶ I personally found several minor errors and inconsistencies with the *Harvard* statistics²⁷ and found myself wanting more information as to how the *Harvard* statistics were compiled.²⁸

B. VISUALIZATIONS OF VOTING ALIGNMENTS

Over the years there have been several efforts to spatially visualize the relationship of the Justices to one another.²⁹ In 1941, Pritchett published a linear continuum of the Justices in the 1939 and 1940 Terms based on their number of dissents.³⁰ 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.³¹ Starting in 1962, Schubert used multidimensional factor analysis (or scaling) of Justice voting behavior to produce spatial distributions of the

(2004):

26. See Epstein et al., *supra* note 10.

27. For example, the article concerning the 1967 Term uses the wrong N value for Justice Marshall relative to Justice Black. The N value should be 70 instead of 170 to be consistent with the other N values for Justice Marshall and the resultant percentages in the five year table on p. 311 of the same volume. See *The 1967 Term*, *supra* note 2, at 307, 311. For the 1977 Term, the P value should be 91.9 rather than 93.6, based on the O, S, T, & N values given for Justice Marshall relative to Justice Brennan. See *The 1977 Term*, *supra* note 2, at 328. For the 1985 Terms, 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 and 156 on the other half. *The 1985 Term*, *supra* note 2, at 305. 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.

28. For example, Table C and note 1 in the section addressing the 1956 Term statistics indicate that there were thirty-three unanimous cases for the 1956 Term, “[i]ncluding 8 cases decided with concurring votes.” *The 1956 Term*, *supra* note 2, at 103. 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.

29. See G. Edward White, *Unpacking the Idea of the Judicial Center*, 83 N.C. L. REV. 1089 (2005) (discussing early statistical efforts that have produced spatial distributions of the Justices in order to find the spatial or ideological center of the Supreme Court).

30. 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).

31. L.L. Thurstone & J.W. Degan, *A Factorial Study of the Supreme Court*, 37 PROC. OF THE NAT'L ACAD. OF SCI. OF THE U.S. 628 (1951).

Justices.³² In 1985, Spaeth and Altfeld produced spatial, though non-automated, diagrams of the influence relationships amongst the Justices for the Warren and Burger Courts.³³ 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.³⁴

Other political scientists are using other statistical techniques based in part on voting behavior to produce spatial distributions of the Justices.³⁵ 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.³⁶ Mathematician, Lawrence Sirovich, used vector models and singular value decomposition to produce two dimensional representations of the voting patterns of the Rehnquist Court.³⁷ 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.”³⁸

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

33. Harold J. Spaeth & Michael F. Altfeld, *Influence Relationships within the Supreme Court: A Comparison of the Warren and Burger Courts*, 38 *W. POL. Q.* 70-83 (1985).

34. 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); see also Epstein et al., *supra* note 10, at 797; 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., *Ideological Drift Among Supreme Court Justices: Who When, and How Important?*, 102 *NW. U. L. REV.* (forthcoming 2007), available at <http://www.law.northwestern.edu/lawreview/Colloquy/2007/8/LRColl2007n8Epstein.pdf>.

35. See Lee Epstein et al., *The Judicial Common Space* (April 14, 2005) (research paper prepared for the Northwestern Faculty Conference, Law and Positive Political Theory: Legal Doctrine and Political Control, April 29, 2005), available at <https://www.law.northwestern.edu/faculty/conferences/research/Epstein.pdf>.

36. Jeffrey C. Johnson et al., *Analysis of Voting Patterns in U.S. Supreme Court Decisions* (February 16-20, 2005) (research paper prepared for Sunbelt XXV, International Sunbelt Social Network Conference, Redondo Beach, CA), abstract available at <http://www.socsci.uci.edu/~ssnconf/conf/SunbeltXXVProgram.pdf>.

37. Lawrence Sirovich, *A pattern analysis of the second Rehnquist U.S. Supreme Court*, 100 *PNAS* 7432 (2003).

38. Epstein et al., *supra* note 10, at 787.

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.³⁹ 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.⁴⁰ Also, there is a group of scholars that has employed MDS to map social networks associated with various legal issues. These publications include spatial maps of the networks⁴¹ 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 multidimen-

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

40. Jeremy A. Blumenthal, *Perceptions of Crime: A Multidimensional Analysis with Implications for Law and Psychology*, 38 MCGEORGE L. REV. (forthcoming 2007), available at <http://ssrn.com/abstract=942311>

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

42. Peter A. Hook, *Visualizing the Topic Space of the United States Supreme Court*, (Indiana Legal Studies Research Paper No. 68), available at <http://ssrn.com/abstract=948759>. Proceedings of the 11th International Conference on Scientometrics and Informetrics (ISSI 2007), Madrid, Spain, June 25-27, pp. 387-96. working paper version (June 22, 2007).

43. See KEITH T. POOLE, SPATIAL MODELS OF PARLIAMENTARY VOTING (2005); Bernard Grofman & Timothy J. Brazill, *Identifying the Median Justice on the Supreme Court Through Multidimensional Scaling: Analysis of "Natural Courts" 1953-1991*, 112 PUB. CHOICE 55, 55 n.1 (2002).

sional space to one dimension. In 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

44. Grofman & Brazill, *supra* note 43.

45. See Poli 100B Congress, 2 February 2006. http://voteview.com/congress_UCSD_2_February_2006.htm.

46. *Id.*

47. Frank B. Cross, Thomas A. Smith, & Antonio Tomarchio, *Determinants of Cohesion in the Supreme Court's Network of Precedents* (Aug. 2006) (U of Texas Law, Law and Econ Research Paper No. 90, San Diego Legal Studies Paper No. 07-67), available at <http://ssrn.com/abstract=924110>; Frank B. Cross & Thomas A. Smith, *The Reagan Revolution in the Network of Law* (June 2006), available at <http://ssrn.com/abstract=909217>; Thomas A. Smith, *The Web of Law* (Spring 2005) (San Diego Legal Studies Research Paper No. 06-11), available at <http://ssrn.com/abstract=642863>.

48. Seth J. Chandler, *The Network Structure of Supreme Court Jurisprudence* (June 10, 2005) (University of Houston Law Center No. 2005-W-01), available at <http://ssrn.com/abstract=742065>.

49. Seth J. Chandler, *The Network Structure of the Uniform Commercial Code: It's A Small World After All* (2005) (paper presented at the 2005 Wolfram Technology Conference), available at <http://library.wolfram.com/infocenter/Conferences/5800/>.

50. James H. Fowler et al., *Network Analysis and the Law: Measuring the Legal Importance of Supreme Court Precedents*, 15 POL. ANALYSIS 324 (2007); James H. Fowler, *Connecting the Congress: A Study of Cosponsorship Networks*, 14 POL. ANALYSIS 456

III. METHODOLOGY

A. 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—the 1956 to 2005 Terms (roughly October 1956 to July 2006).⁵³ The author created one such spreadsheet per term for each of the different *Harvard Law Review* counting methods (O,⁵⁴ S,⁵⁵ D,⁵⁶ N^{57,58}). Relying on a consistent ordering of the Jus-

(2006); James H. Fowler & Sangick Jeon, *The Authority of Supreme Court Precedent*, SOC. NETWORKS (forthcoming 2007), available at <http://jhffowler.ucsd.edu/>.

51. Wayne McIntosh et al., Using Information Technology to Examine the Communication of Precedent: Initial Findings and Lessons From the CITE-IT Project (Mar. 17-19, 2005) (paper prepared for the 2005 Annual Meeting of the Western Political Science Association, Oakland, California), available at <http://www.bsos.umd.edu/gvpt/CITE-IT/Documents/McIntosh%20etal%202005%20WPSA.pdf>.

52. See *supra* note 2.

53. See *infra* Table 2.

54. The O 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. *The 1956 Term, supra* note 2, at 103 tbl. IV, n.k. Subsequent issues would define the method as follows: “ ‘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.” *The 2005 Term, supra* note 2, at 376 tbl. I, n.g.

55. The S 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. *The 1956 Term, supra* note 2, at 103 tbl. IV, n.k. Subsequent issues would define the method as follows: “ ‘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.” *The 2005 Term, supra* note 2, at 376 tbl. I, n.g. The language as to Justices who “join more than one separate opinion in a case are considered to have agreed only once,” did not come about until the 1996 Term. *The 1996 Term, supra* note 2, at 433 tbl. I, n.f. Thus, one would have to look at actual cases and voting patterns to see if the method was done consistently over the entire dataset.

56. The D 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.” *The 1987 Term, supra* note 2, at 252 tbl. I, n.f. It was in response to the problem of aggregated O and S totals leading to greater than 100 percent agreement. See *id.* (“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.”)

57. The N method counts “the number of times that the Justices participated in the same case.” *The 1956 Term, supra* note 2, at 103 tbl. IV, n.k. Subsequent definitions were very similar: “ ‘N’ represents the number of decisions in which both Justices participated, and thus the number of opportunities for agreement.” *The 2005 Term, supra* note 2, at 376 tbl. I, n.g.

58. The T method is merely the count of overall agreement, O plus S. Because this

tices, 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, and N), the author created one workbook file that had fifty individual sheets whose cell contents could easily be aggregated on the fifty-first 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 ($\sum O / \sum N$). 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.⁵⁹

B. MDS (MULTIDIMENSIONAL SCALING)

The visualizations that are Charts 4 and 5 were produced with the multidimensional scaling (MDS) algorithm embedded in the R statistical software package.⁶⁰ The mathematics and principles behind MDS have been written about extensively⁶¹ 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.⁶² 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 and 5.

The MDS algorithm is a deterministic process. This means that repeated processing of the data will produce similar spatial

could be derived automatically from the O and S matrices, 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.

59. See *infra* Table 2.

60. Free software is available at The R Project for Statistical Computing, <http://www.r-project.org/>.

61. See JOSEPH B. KRUSKAL & MYRON WISH, *MULTIDIMENSIONAL SCALING* (1978); Blumenthal, *supra* note 40; Grofman & Brazill *supra* note 43.

62. POOLE, *supra* note 43, at 1.

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 and Brazill 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.”⁶³ This is fortunate as two-space, or two-dimensional, solutions are perfect for printed visualizations.

C. NETWORK VISUALIZATIONS

To produce additional visualizations of the voting relationships on the Court⁶⁴, I used the spring force layout algorithm embedded in the network analysis software Pajek.⁶⁵ 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 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

63. Grofman & Brazill, *supra* note 43, at 58; *see also* Martin et al., *supra* note 34, at 1281 n.26 (“Nearly all statistical work on the United States Supreme Court suggests that the issue space is single-dimensional.” (citing Grofman & Brazill, *supra* note 43, at 58)).

64. *See infra* Charts 3, 7, and 8.

65. Networks/Pajek: Program for Large Network Analysis, <http://vlado.fmf.uni-lj.si/pub/networks/pajek/> (providing information and links to the Pajek software); *see also* WOUTER DE NOOY ET AL., EXPLORATORY SOCIAL NETWORK ANALYSIS WITH PAJEK (Structural Analysis in the Social Sciences Series No. 27, 2005); Vladimir Batagelj & Andrej Mrvar, *Pajek—Analysis and Visualization of Large Networks*, in GRAPH DRAWING SOFTWARE 77 (Mathematics and Visualization Series, Michael Jünger & Petra Mutzel eds., 2003); Vladimir Batagelj & Andrej Mrvar, *Pajek—Program for Large Network Analysis*, 21(2) CONNECTIONS 47 (1998).

Justices in the fifty-year dataset.⁶⁶ 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

A. 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 fifty years of the dataset. In other words, I want to produce visualizations similar to Charts 4 and 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 in Chart 1, the aggregate percentage agreement for the Court appears to seesaw through the fifty 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,⁶⁷ Chief Justice Burger (78% voting agreement using the *Harvard Law Review* O Method⁶⁸).⁶⁹ Indeed, a contemporaneous account observed that “the Warren Court momentum has been brought to a screeching halt”⁷⁰ by the two new Nixon appointees Burger and Blackmun.

66. See *infra* Chart 3.

67. LINDA GREENHOUSE, *BECOMING JUSTICE BLACKMUN: HARRY BLACKMUN'S SUPREME COURT JOURNEY* (2005).

68. See *The 1970 Term, supra* note 2, at 351.

69. This is in marked contrast to the voting agreement (O Method) for the last term the two served together (1985), which was 48%. *The 1985 Term, supra* note 2, at 305.

70. *The 1970 Term, supra* note 2, at 40 (citing Philip B. Kurland, *The Burger Court Shows Its Stripes*, 18 *LAW SCH. REC.* 7, 9 (1971) (University of Chicago Law School)).

At first glance, an Aggregate Harmony Metric of 50% seems implausible.⁷¹ As to the 1970 Term, however, of the 122 full opinions, less than 20% were unanimous (23).⁷² Furthermore, “there were fifteen major cases . . . in which the Court was so split that the cases were decided without a majority opinion.”⁷³ This is in contrast to two such cases for each of the two previous terms.⁷⁴ Additionally, seven cases were decided by a four to four vote⁷⁵ and there were twenty cases decided by a four to five vote.⁷⁶

Contrast this to the 2005 Term in which 44% of the cases were unanimous (36 out of 81)⁷⁷ and there were only nine, five to four decisions.⁷⁸ This “quiet” year had the highest Aggregate Harmony Metric (70%) of the entire fifty-term span. This was most likely the result of several things: (1) O’Connor participating in twenty-four 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 fifty 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 (Five Term bins). One scholar has noted a

71. Assume that there were 100 cases for the term and all were decided by a five to four 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 $(\Sigma O / \Sigma N) = .2777$.

72. *The 1970 Term, supra* note 2, at 349.

73. *Id.* at 352.

74. *Id.*

75. *Id.* at 353

76. *Id.*

77. *The 2005 Term, supra* note 2, at 377.

78. *Id.* at 378.

change in the voting blocks of close decisions immediately after *Bush v. Gore*.⁷⁹ 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 and 2004) were again at the median (59%).

B. VOTING SUPERLATIVES

One benefit of having aggregated the *Harvard Law Review's* statistics for all fifty 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 Warren and Marshall are at a fifty-year high for those having decided more than 100 cases together (88%).⁸⁰ 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."⁸¹ In fact, the percentage of voting agreement between Scalia and Thomas for the time range of the dataset is 67%.⁸² This value is not even in the top twenty-five.⁸³ Nor is it even in the forth quartile.⁸⁴ 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.⁸⁵

There is utility in such measures. For one, the data might be of use to those scholars evaluating the "Freshman Effect."⁸⁶

79. David Cole, *The Liberal Legacy of Bush v. Gore*, 94 GEO. L.J. 1427 (2006).

80. See *infra* Table 7.

81. See Wermiel, *supra* note 4, at 316.

82. See *infra* Table 2.

83. See *infra* Table 7.

84. See *infra* Table 10.

85. See *infra* Table 8.

86. See 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); Saul Brenner, *Another Look at Freshman Indecisiveness on the United States Supreme Court*, 16 POLITY 320 (1983); Robert L. Dudley, *The Freshman Effect and Voting Alignments: A Reexamination of Judicial Folklore*, 21 AM. POL. RES. 360 (1993); Edward V. Heck & Melinda Gann Hall, *Bloc Voting and the Freshman Justice Revisited*, 43 J. POL. 852 (1981); Christopher E. Smith, *The Impact of New Justices: The U.S. Supreme Court and Criminal Justice*, 30 AKRON L. REV. 55 (1996); see also David W. Allen, *Voting Blocs and the Freshman Jus-*

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 second and third quartiles, 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 fourth quartile.⁸⁷ 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.

C. VISUALIZATIONS

As an information science researcher, I am actively involved in the creation of knowledge domain visualizations (KDV). KDV 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.”⁸⁸ KDV (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[.]”⁸⁹ Chart 3 provides such a big picture overview of the last fifty terms of the Supreme Court. There is an implied element 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 as how these percentages compared to their contemporaries on the Court. Furthermore,

tice on State Supreme Courts, 44 W. POL. Q. 727 (1991).

87. See *infra* Table 10.

88. Peter A. Hook & Katy Börner, *Educational Knowledge Domain Visualizations: Tools to Navigate, Understand, and Internalize the Structure of Scholarly Knowledge and Expertise*, in *NEW DIRECTIONS IN COGNITIVE INFORMATION RETRIEVAL* 187, 194 (Amanda Spink & Charles Cole eds., 2005).

89. CHARLES K. WEST ET AL., *INSTRUCTIONAL DESIGN: IMPLICATIONS FROM COGNITIVE SCIENCE* 58 (1991).

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 and 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 fifty-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 five to four voting block for this time (O'Connor, Kennedy, Rehnquist, Scalia and Thomas, versus Stevens, Ginsburg, Souter, and Breyer).⁹⁰

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.⁹¹ One can see that as compared to Chart 4, Stevens has 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 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.

90. See *infra* Chart 6.

91. There are a total of twenty-five cases, which include, for example, *Ashcroft v. ACLU*, 542 U.S. 656 (2004); *McConnell v. FEC*, 540 U.S. 93 (2003); *Virginia v. Black*, 538 U.S. 343 (2003). (*Virginia v. Hicks*, 539 U.S. 113 (2003), was not included because it was a nine to zero decision.)

Chart 6 emphasizes that O'Connor's change from one voting bloc to the next accounts for 63% of all five to four decisions (1994 to 2003 Terms).⁹² 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.⁹³ 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.⁹⁴ The status of O'Connor and, to a lesser extent, Kennedy, as swing voters is visually portrayed in Charts 7 and 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 al-

92. O'Connor voted with Kennedy, Rehnquist, Scalia, and Thomas against Stevens, Breyer, Ginsburg, and Souter eighty-two times. O'Connor voted with Stevens, Breyer, Ginsburg, and Souter against Kennedy, Rehnquist, Scalia, and Thomas twenty-eight times. These totals, 82 plus 28 (110), account for 63% of the 175 5 to 4 votes for the time period. See the articles addressing the 1994 to 2003 Terms, *supra* note 2.

93. Kennedy voted eight times with Stevens, Breyer, Ginsburg, and Souter against O'Connor, Rehnquist, Scalia, and Thomas. See the articles addressing the 1994 to 2003 Terms, *supra* note 2.

94. This is 124 of all of the 175, 5 to 4 decisions.

gorithms 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.

Table 1A – Aggregate Harmony Metric ($\Sigma O/\Sigma N$)
(1956-2005 Terms)

Term	Court	Aggregate Percentage Agreement (O Method)	Cumulative O Count	Cumulative N Count
1956	Warren 3 & 4	57	2069	3631
1957	Warren 4	56	2351	4188
1958	Warren 5	58	2206	3795
1959	Warren 5	51	1878	3651
1960	Warren 5	55	2257	4120
1961	Warren 5 & 6	62	1672	2681
1962	Warren 7	59	2245	3825
1963	Warren 7	67	2957	4440
1964	Warren 7	58	1817	3146
1965	Warren 8	64	2095	3298
1966	Warren 8	59	2412	4104
1967	Warren 9	65	2624	4023
1968	Warren 9	62	2389	3835
1969	Burger 1	62	1558	2509
1970	Burger 2	50	2118	4244
1971	Burger 3	54	2311	4279
1972	Burger 3	55	3140	5666
1973	Burger 3	56	3079	5479
1974	Burger 3	59	2779	4692
1975	Burger 3 & 4	58	2905	5050
1976	Burger 4	55	2693	4890
1977	Burger 4	51	2279	4458

1978	Burger 4	55	2597	4707
1979	Burger 4	54	2801	5193
1980	Burger 4	54	2614	4805
1981	Burger 5	54	3187	5887
1982	Burger 5	58	3361	5792
1983	Burger 5	65	3689	5697
1984	Burger 5	66	3253	4965
1985	Burger 5	56	3136	5610
1986	Rehnquist 1	56	2998	5385
1987	Rehnquist 2	66	2904	4403
1988	Rehnquist 2	61	3087	5040
1989	Rehnquist 2	53	2633	4988
1990	Rehnquist 3	60	2505	4192
1991	Rehnquist 4	55	2119	3864
1992	Rehnquist 4	63	2566	4104
1993	Rehnquist 5	59	1830	3108
1994	Rehnquist 6	64	1947	3041
1995	Rehnquist 6	64	1813	2820
1996	Rehnquist 6	65	2002	3088
1997	Rehnquist 6	68	2261	3340
1998	Rehnquist 6	59	1703	2900
1999	Rehnquist 6	60	1652	2772
2000	Rehnquist 6	61	1859	3057
2001	Rehnquist 6	58	1665	2868
2002	Rehnquist 6	63	1765	2784
2003	Rehnquist 6	59	1682	2833
2004	Rehnquist 6	59	1629	2756
2005	Roberts 1 & 2	70	1914	2749

Table 1B – Court Composition and Number of Full Opinions
(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.)	"Full Opinions"
1956	Warren 3 & 4	Black, Reed (42), Frankfurter, Douglas, Burton, Clark, Warren, Harlan, Brennan, Whittaker (39)	115
1957	Warren 4	Black, Frankfurter, Douglas, Burton, Clark, Warren, Harlan, Brennan, Whittaker	119
1958	Warren 5	Black, Frankfurter, Douglas, Clark, Warren, Harlan, Brennan, Whittaker, Stewart	112
1959	Warren 5	Black, Frankfurter, Douglas, Clark, Warren, Harlan, Brennan, Whittaker, Stewart	105
1960	Warren 5	Black, Frankfurter, Douglas, Clark, Warren, Harlan, Brennan, Whittaker, Stewart	118
1961	Warren 5 & 6	Black, Frankfurter, Douglas, Clark, Warren, Harlan, Brennan, Whittaker (34), Stewart, White (16)	96
1962	Warren 7	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Goldberg	117
1963	Warren 7	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Goldberg	127
1964	Warren 7	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Goldberg	101
1965	Warren 8	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Fortas	107
1966	Warren 8	Black, Douglas, Clark, Warren, Harlan, Brennan, Stewart, White, Fortas	119
1967	Warren 9	Black, Douglas, Warren, Harlan, Brennan, Stewart, White, Fortas, Marshall	127
1968	Warren 9	Black, Douglas, Warren, Harlan, Brennan, Stewart, White, Fortas, Marshall	122
1969	Burger 1	Black, Douglas, Harlan, Brennan, Stewart, White, Marshall, Burger (8 JUSTICES ONLY)	94
1970	Burger 2	Black, Douglas, Harlan, Brennan, Stewart, White, Marshall, Burger, Blackmun	122

1971	Burger 3	Douglas, Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist	151
1972	Burger 3	Douglas, Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist	154
1973	Burger 3	Douglas, Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist	157
1974	Burger 3	Douglas, Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist	137
1975	Burger 3 & 4	Douglas (5), Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens (80)	159
1976	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	142
1977	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	135
1978	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	138
1979	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	149
1980	Burger 4	Brennan, Stewart, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens	139
1981	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	157
1982	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	152
1983	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	153
1984	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	151
1985	Burger 5	Brennan, White, Marshall, Burger, Blackmun, Powell, Rehnquist, Stevens, O'Connor	159
1986	Rehnquist 1	Brennan, White, Marshall, Blackmun, Powell, Rehnquist, Stevens, O'Connor, Scalia	152
1987	Rehnquist 2	Brennan, White, Marshall, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy	142
1988	Rehnquist 2	Brennan, White, Marshall, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy	143
1989	Rehnquist 2	Brennan, White, Marshall, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy	139
1990	Rehnquist 3	White, Marshall, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter	129
1991	Rehnquist 4	White, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas	114
1992	Rehnquist 4	White, Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas	114

1993	Rehnquist 5	Blackmun, Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg	67
1994	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	68
1995	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	72
1996	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	68
1997	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	69
1998	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	61
1999	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	77
2000	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	66
2001	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	61
2002	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	78
2003	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	80
2004	Rehnquist 6	Rehnquist, Stevens, O'Connor, Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer	79
2005	Roberts 1 & 2	Stevens, O'Connor (24), Scalia, Kennedy, Souter, Thomas, Ginsburg, Breyer, Roberts, Alito (40)	81

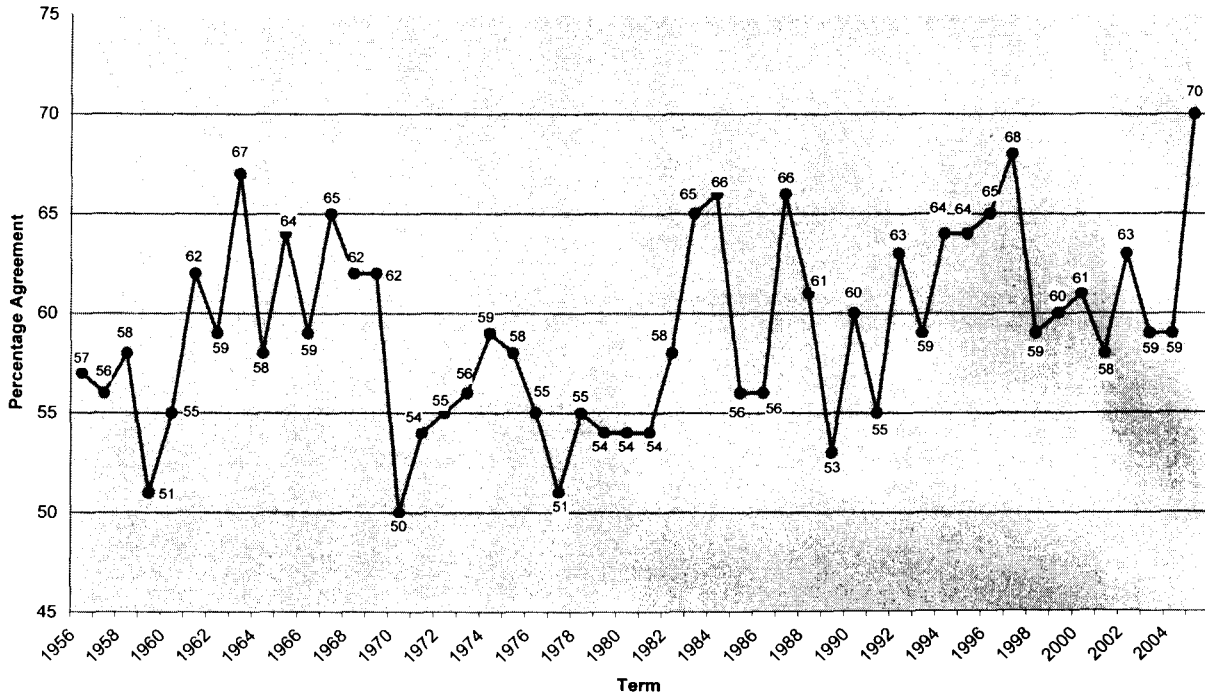
Table 1C – Superlatives (Highest & Lowest Percentage Agreement per Term (O Method) (1956-2005 Terms))

Term	%	Highest % Agreement Justice 1	Highest % Agreement Justice 2	%	Lowest % Agreement Justice 1	Lowest % Agreement Justice 2
1956	85	Reed	Clark	37	Douglas	Harlan
1957	71	Black Warren	Warren Brennan	40	Douglas	Harlan
1958	72	Clark Whittaker	Whittaker Stewart	38	Douglas	Harlan
1959	78	Warren	Brennan	28	Frankfurter	Douglas
1960	74	Warren	Brennan	34	Frankfurter	Douglas
1961	94	Clark	White	37	Black	Harlan
1962	83	Warren	Brennan	32	Douglas	Harlan
1963	90	Warren	Brennan	42	Black	Harlan
1964	89	Warren	Brennan	29	Douglas	Harlan
1965	87	Warren	Brennan	36	Douglas	Harlan
1966	85	Warren	Brennan	33	Douglas	Harlan
1967	90	Warren	Brennan	46	Black Douglas	Harlan Harlan
1968	92	Warren Brennan	Brennan Marshall	36	Black	Harlan
1969	83	Brennan	Marshall	44	Douglas	Burger
1970	78	Burger	Blackmun	36	Douglas	Harlan
1971	69	Stewart	White	26	Douglas	Rehnquist
1972	80	Burger	Blackmun	28	Douglas	Rehnquist
1973	77	Burger	Rehnquist	28	Douglas	Rehnquist

1974	77	Blackmun Powell	31	Douglas Rehnquist
1975	79	Burger Powell	20	Douglas White
1976	69	White Rehnquist Powell	36	Brennan Burger
1977	62	Brennan Marshall	32	Brennan Rehnquist
1978	70	White Burger Powell	34	Brennan Marshall Rehnquist Rehnquist
1979	69	Burger Powell	30	Marshall Rehnquist
1980	69	White Burger Powell Rehnquist	35	Marshall Rehnquist
1981	66	Burger Rehnquist O'Connor	37	Brennan Rehnquist
1982	77	White Burger Powell	37	Marshall Rehnquist
1983	84	White Burger O'Connor	45	Marshall Rehnquist
1984	81	Burger Powell O'Connor O'Connor	47	Marshall Rehnquist
1985	81	Powell O'Connor	37	Marshall Rehnquist
1986	77	Rehnquist Powell	39	Marshall Marshall Rehnquist Scalia
1987	83	White Kennedy	51	Marshall Scalia
1988	85	Rehnquist Kennedy	47	Marshall O'Connor
1989	75	White Rehnquist	35	Marshall Scalia
1990	83	O'Connor Souter	39	Stevens Scalia
1991	72	Kennedy Souter	32	Blackmun Scalia
1992	82	Rehnquist Kennedy	44	Stevens Thomas
1993	72	Rehnquist O'Connor	38	Blackmun Thomas
1994	80	Rehnquist Kennedy	41	Stevens Thomas
1995	78	O'Connor Kennedy	43	Stevens Thomas

1996	83	Rehnquist	Kennedy	44	Stevens Stevens	Scalia Thomas
1997	85	Rehnquist	Kennedy	47	Stevens	Scalia
1998	76	Rehnquist O'Connor	O'Connor Kennedy	37	Stevens	Thomas
1999	86	Rehnquist	O'Connor	40	Stevens	Scalia
2000	81	Rehnquist	Kennedy	40	Stevens	Scalia
2001	77	Rehnquist	Kennedy	37	Souter	Thomas
2002	79	Rehnquist	Kennedy	44	Stevens	Thomas
2003	78	Rehnquist	O'Connor	39	Stevens	Scalia
2004	73	O'Connor	Kennedy	41	Stevens Thomas	Thomas Ginsburg
2005	96	O'Connor	Souter	45	Stevens	Alito

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)**

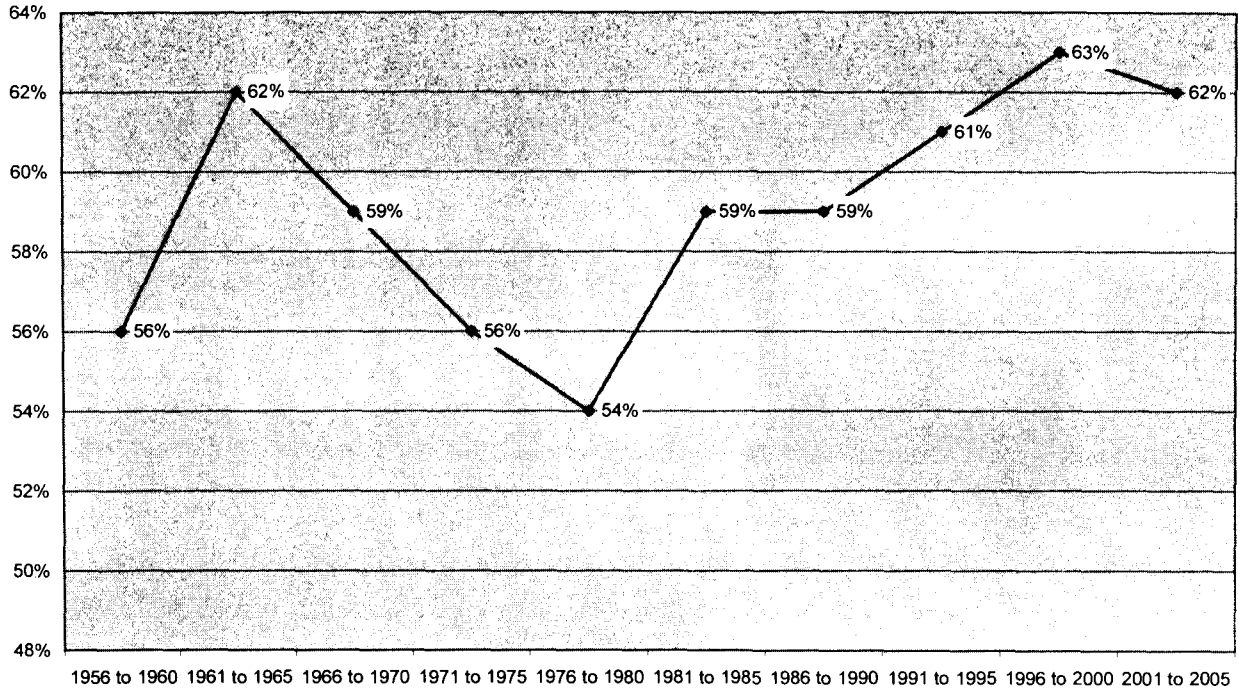


Table 2 – Aggregate % Voting Agreement (1956-2005 Terms)

	Black	Reed	Frankfurter	Douglas	Burton	Clark	Warren	Harlan	Brennan	Whittaker	Stewart	White	Goldberg	Fortas	Marshall	Burger	Blackmun	Rehnquist	Powell	Stevens	O'Connor	Scalia	Kennedy	Souter	Thomas	Ginsburg	Breyer	Roberts	Alito	
Black		56	43	56	45	59	68	41	63	47	49	58	61	59	53	52	53													
Reed	56		51	62	69	85	71	57	68																					
Frankfurter	43	51		38	55	60	46	60	54	59	60																			
Douglas	56	62	38		41	54	66	39	60	42	46	51	60	66	52	35	36	28	37											
Burton	45	69	55	41		63	50	58	58	65																				
Clark	59	85	60	54	63		68	55	71	66	64	71	60	69																
Warren	68	71	46	66	50	68		49	82	53	61	75	76	80	88															
Harlan	41	57	60	39	58	55	49		53	58	56	53	43	50	56	58	53													
Brennan	63	68	54	60	58	71	82	53		57	57	59	77	79	61	47	54	42	51	52	51	46	51							
Whittaker	47		59	42	65	66	53	58	57		64																			
Stewart	49		60	46		64	61	56	57	64		62	61	58	54	63	61	61	68	57										
White	58			51		71	75	53	59			62	66	67	54	69	64	68	70	56	71	67	74	70	63					
Goldberg	61			60	60	76	43	77		61	66																			
Fortas	59			66		69	80	50	79		58	67			85															
Marshall	53			52			88	56	61		54	54		85		46	53	41	50	50	47	43	48	54						
Burger	52			35				58	47		63	69			46		66	70	72	53	76									
Blackmun	53			36				53	54		61	64			53	66		58	66	54	58	49	55	57	42	58		61		
Rehnquist				28						42	61	68			41	70	58		69	51	74	69	77	65	68	61				
Powell				37						51	68	70			50	72	66	69		55	74	70								
Stevens										52	57	56			50	53	54	51	55		55	46	56	60	44	63	61	65	45	
O'Connor										51	71				47	76	58	74	74	55		66	75	69	65	65	68	91		
Scalia												67			43	49	69	70		46	66	69	57	67	67	54	52	82	70	
Kennedy										51		74			48	55	77			56	75	69	69	67	65	65	65	79	70	
Souter											70				54	69	65			60	69	57	69	54	70	69	74	58		
Thomas											63						42	68		44	65	67	67	54		51	51	78	70	
Ginsburg																	58	61		63	65	54	65	70	51		68	73	55	
Breyer																				61	68	52	65	69	51	68		74	50	
Roberts																				65	82	79	74	78	73	74	74	82		
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)
1 st Quartile	0% to 55.25%
2 nd Quartile	55.26% to 59.16
3 rd Quartile	59.16% to 62.75%
4 th 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 % Agreement (O Method)	Cumulative O Count	Cumulative N Count	"Full Opinions"
Warren (1956 to 1968)	59	28,972	48,737	1485
Burger (1969 to 1985)	57	47,500	83,923	2488
Rehnquist (1986 to 2004)	60	40,620	67,343	1913
Roberts (2005)	70	1914	2749	81

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

Court	%	Highest % Agreement Justice 1	Highest % Agreement Justice 2	%	Lowest % Agreement Justice 1	Lowest % Agreement Justice 2
Warren (1956 to 1968)	90	Brennan	Marshall	38	Frankfurter Douglas	Douglas Harlan
Burger (1969 to 1985)	76	Burger	O'Connor	28	Douglas	Rehnquist
Rehnquist (1986 to 2004)	77	Rehnquist Rehnquist	Powell Kennedy	42	Blackmun	Thomas
Roberts (2005)	96	O'Connor	Souter	45	Stevens	Alito

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

Term	Court	Aggregate % 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 U.S. Supreme Court (1956-2005 Terms)
[Spatial distribution based on the percentage of co-voting in Supreme Court opinions. Rendered with Pajek.]

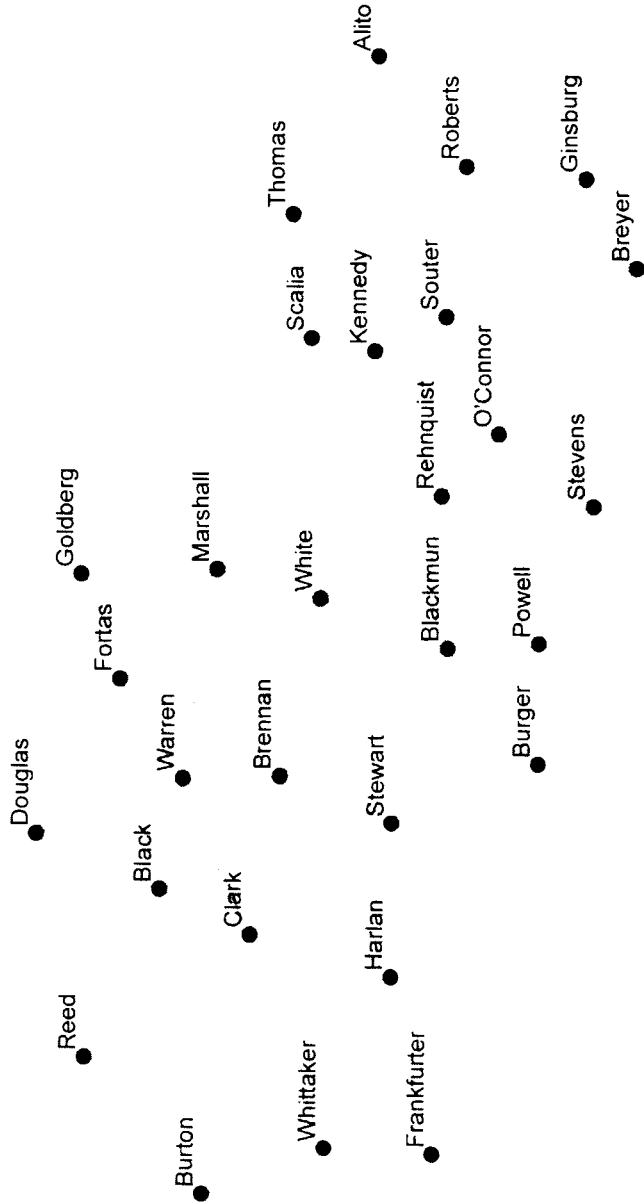


Chart 4 – Non-Unanimous Cases (1994-2003 Terms) (Spatial distribution based on co-voting using MDS and the software program R.) [Photos used by permission: Collection, The Supreme Court Historical Society.]

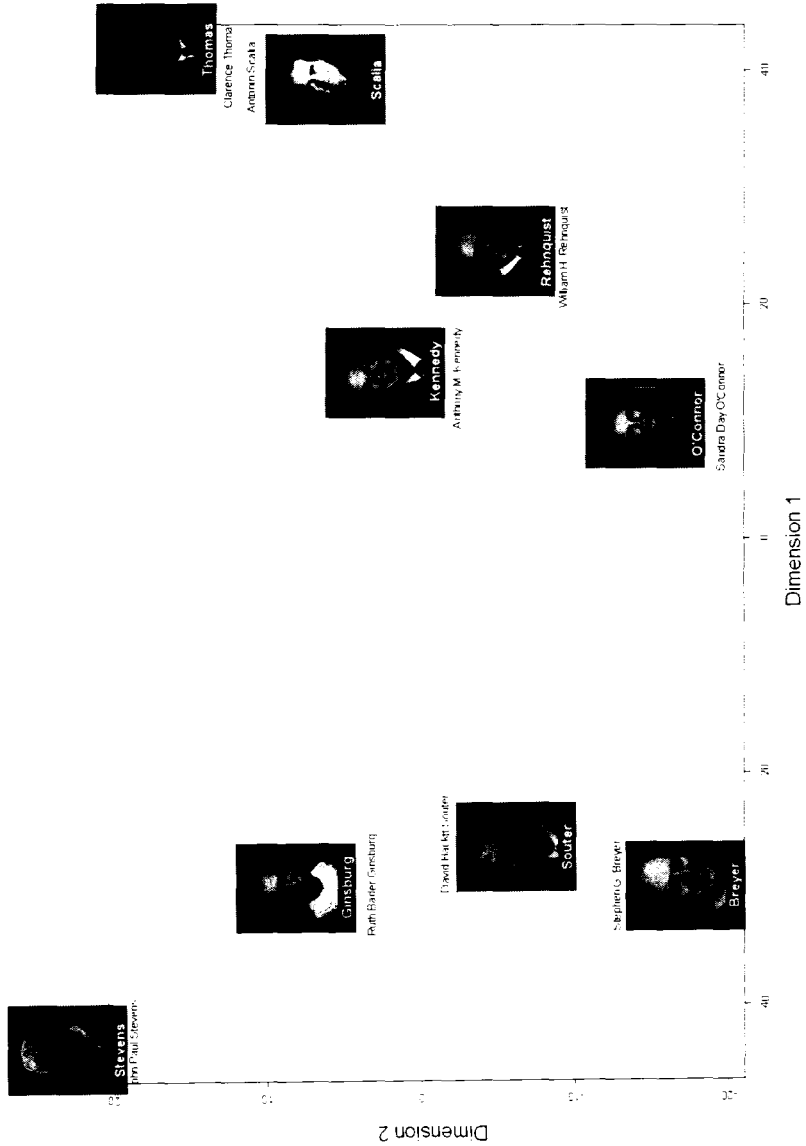


Chart 5 – Freedom of Speech Cases (1994-2003 Terms) (Spatial distribution based on co-voting using MDS and the software program R.) [Photos used by permission: Collection, The Supreme Court Historical Society.]

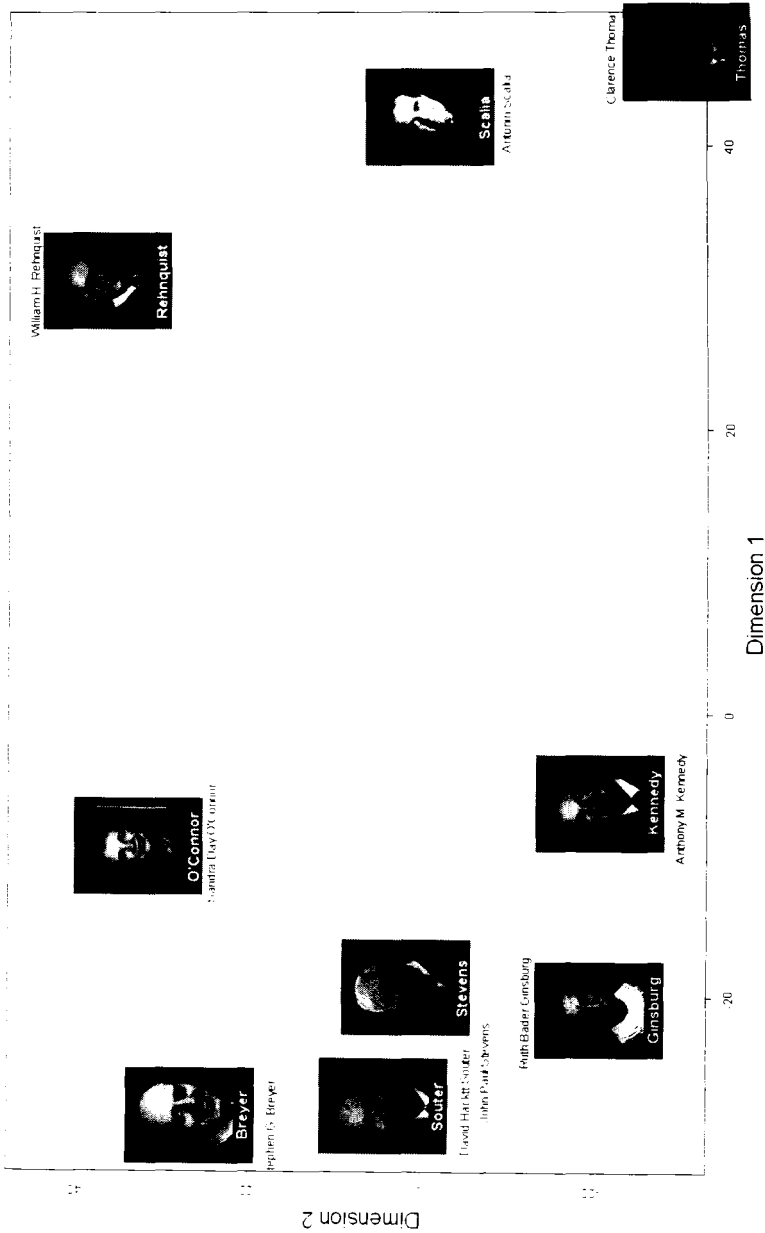
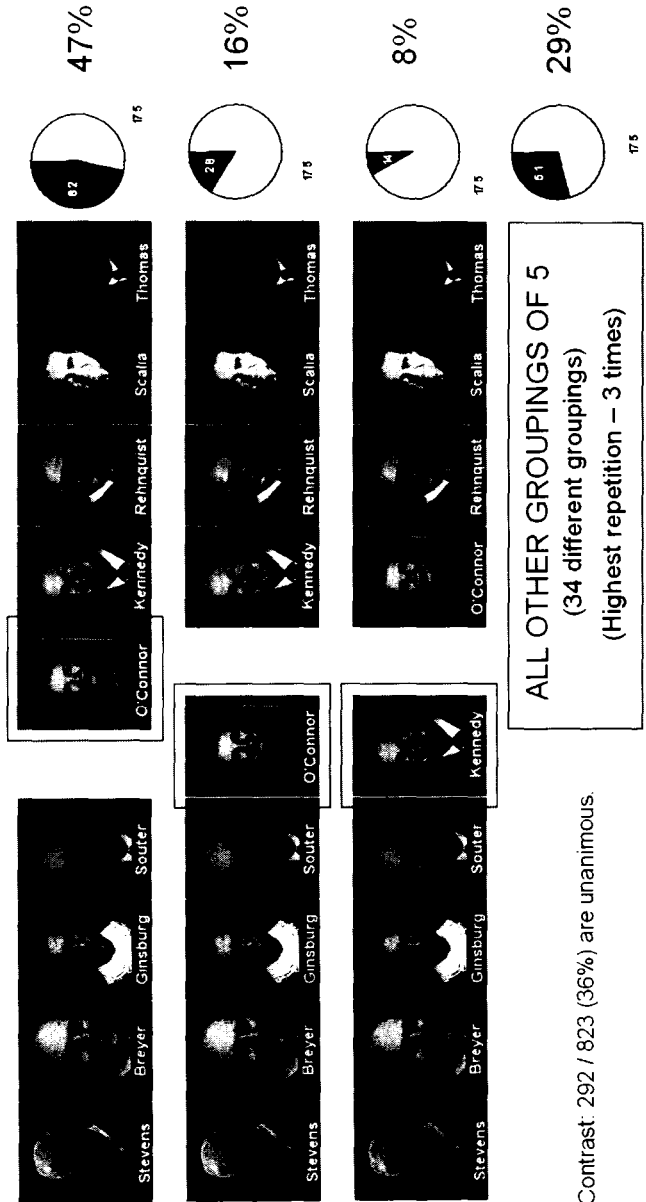


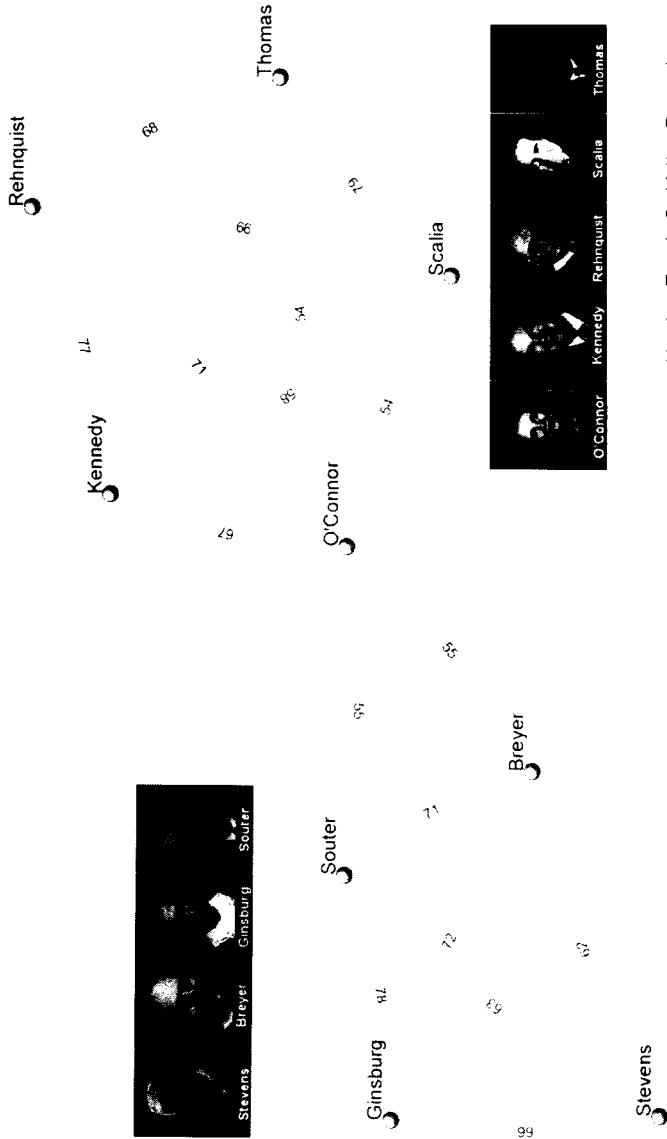
Chart 6 – Frequency of Voting Blocks in 5-4 Cases (1994-2003 Terms) [Photos used by permission: Collection, The Supreme Court Historical Society.]



Total 5 to 4 Cases = 175

Source: Statistics harvested from the Harvard Law Review.

Chart 7 – Thresholding (Voting Together > 50%) Reveals Ideological Cliques (1994-2003 Terms, Non-Unanimous Cases) [Photos used by permission: Collection, The Supreme Court Historical Society.] Voting frequencies represented as the edge weight between nodes and presented visually as a graph. (Rendered with Pajek using a stochastic, spring force algorithm.)



Note: Number Equals Co-Voting Percentage

Chart 8 – Thresholding (Voting Together > 49%) Reveals Ideological Cliques (1994-2003 Terms, Non-Unanimous Cases) [Photos used by permission: Collection, The Supreme Court Historical Society.] Voting frequencies represented as the edge weight between nodes and presented visually as a graph. (Rendered with Pajek using a stochastic spring force algorithm.)

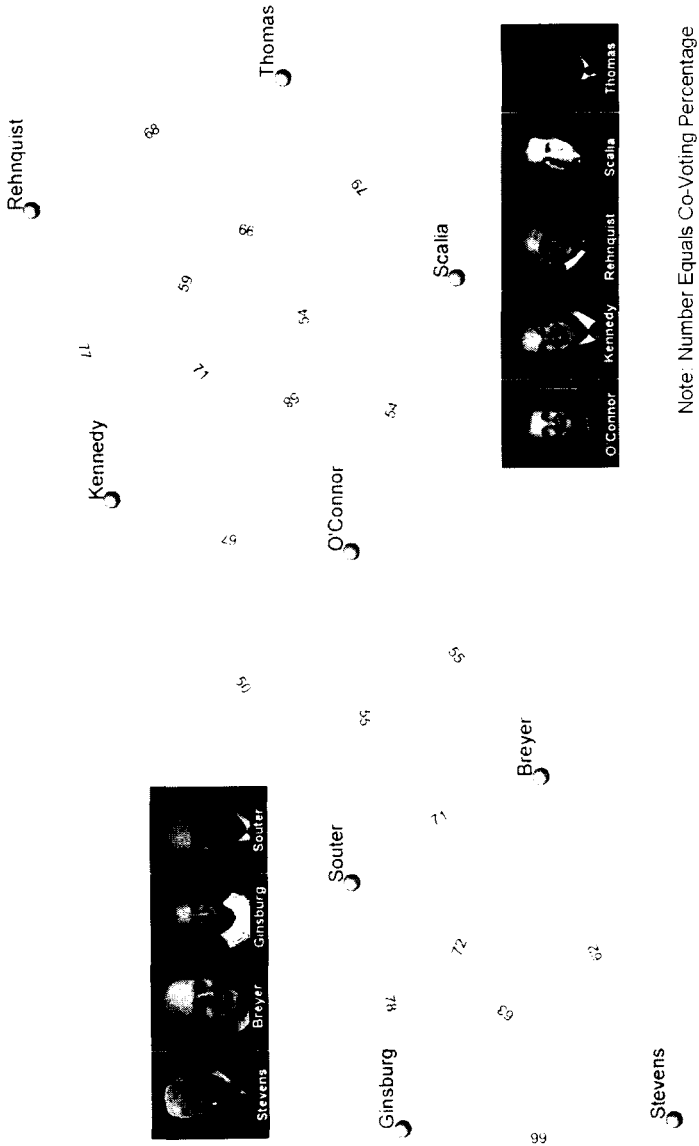


Table 6 – 25 Highest Co-Voting Percentages (1956-2005 Terms)
 (Calculated from O & N data from the *Harvard Law Review*)

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 of Justices Deciding 100 or More Cases Together (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	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 (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

Table 9 – 25 Most Cases Heard Together (1956-2005 Terms)
(Calculated from the N data from the *Harvard Law Review*)

Rank	Justice 1	Justice 2	Co-Voting 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)

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)
1 st Quartile	0% to 53%
2 nd Quartile	53.01% to 59.93%
3 rd Quartile	59.94% to 68%
4 th Quartile	68.01% to 100%

Chart 9

Histogram of Percentages of Co-Voting, O Method

