
**“DON’T CONFUSE ME WITH THE FACTS”: THE USE AND
MISUSE OF SOCIAL SCIENCE ON THE UNITED STATES
SUPREME COURT**

WILLIAM D. BLAKE*

INTRODUCTION

Chief Justice John Roberts evoked a collective groan from social scientists during oral arguments in the Wisconsin partisan gerrymandering case, *Gill v. Whitford*.¹ He argued the plaintiffs were attempting to remove reapportionment decisions “from democracy and [were] throwing them into the courts pursuant to, and it may be simply my educational background, but I can only describe as sociological gobbledygook.”² The (exasperated) plaintiff’s attorney responded, “Your Honor, this is—this is not complicated.”³ Justice Breyer then jumped in to ask a more sympathetic question.⁴

These interrogatories focused on the intelligibility of the efficiency gap, a mathematical formula proposed by the plaintiffs to evaluate the severity of partisan gerrymandering.⁵ If Chief Justice Roberts’s characterization of the efficiency gap was accurate, one can imagine judges needing an army of research assistants furiously writing statistical code in Stata⁶ to decipher its

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* Assistant Professor of Political Science, University of Maryland, Baltimore County. Thanks to Mark Graber for organizing the Maryland Discussion Group on Constitutionalism and to its participants for their helpful feedback. The Schmooze is, quite simply, the highlight of my work year. The quote “Don’t confuse me with the facts” is most famously associated with Rep. Earl Landgrebe (R-IN), a staunch Nixon supporter, explaining why he refused to support the president’s impeachment. The phrase, of course, is much older, with one version going back to the writings of Plato. *See My Mind Is Made Up. Don’t Confuse Me with the Facts*, QUOTE INVESTIGATOR (Feb. 13, 2013), <https://quoteinvestigator.com/2013/02/13/confuse-me/#return-note-5452-10>.

1. 138 S. Ct. 1916 (2018).

2. Transcript of Oral Argument at 40, *Gill v. Whitford*, 138 S. Ct. 1916 (2018) (No. 16-1611). This quip led the American Sociological Association to write an open letter to the Chief Justice defending social science on this and other issues that come before the Court. *See* Dylan Matthews, *Chief Justice John Roberts Is Now Feuding with the Entire Field of Sociology*, VOX (Oct. 12, 2017, 11:20 AM), <https://www.vox.com/policy-and-politics/2017/10/12/16464188/john-roberts-sociological-gobbledygook-eduardo-bonilla-silva-gerrymandering>. The failure of the American Political Science Association to respond prompted an even louder groan from yours truly.

3. Transcript of Oral Argument, *supra* note 2, at 40.

4. *See id.* (“Can you answer the Chief Justice’s question and say the reason they lost is because if party A wins a majority of votes, party A controls the legislature. That seems fair.”).

5. *See* Nicholas Stephanopoulos & Eric McGhee, *Partisan Gerrymandering and the Efficiency Gap*, 82 U. CHI. L. REV. 831 (2015).

6. Stata is a statistical software program used by researchers to manipulate and explain complex data sets. STATA, <https://www.stata.com/> (last visited Aug. 1, 2019).

meaning. In reality, what seemed to baffle the Chief Justice is a simple algebraic expression, invented by a political scientist that any high school freshman should be able to calculate.⁷ Earlier in oral argument, Justice Breyer had described the efficiency gap as, “not quite so complicated as the opposition makes it think.”⁸

This exchange begs the question: what explains the radically different attitudes towards social science between these two Justices? For starters, Chief Justice Roberts was a history major as an undergraduate,⁹ while Justice Breyer received a bachelors in PPE (philosophy, politics, and economics) at Oxford University.¹⁰ Perhaps Chief Justice Roberts is being honest about his educational background in that he may be less familiar with (and therefore less comfortable using) quantitative methods compared to Justice Breyer. Of course, Chief Justice Roberts is also a conservative, while Justice Breyer is more liberal in his judicial ideology.¹¹ Some studies indicate conservatives express less trust in scientists than liberals.¹² The literature also indicates people on both ends of the ideological spectrum use science to support their underlying worldview,¹³ which is what Justice Breyer did in this case. Other studies find individuals, on the left and right, are more likely to deny the accuracy of science that challenges their ideology,¹⁴ much like the Chief Justice did.

Technology complicates constitutional inquiries on many issues, not just gerrymandering, so the Court needs to be scientifically literate to evaluate them. Anecdotal evidence suggests this is not the case. Justice Antonin Scalia refused to join part of an opinion written by fellow conservative Justice Clarence Thomas because Justice Scalia did not agree with the statement,

7. The formula is calculated as follows: Efficiency Gap = Seat Margin – (2 × Vote Margin). Stephanopoulos & McGhee, *supra* note 5, at 853. “Seat Margin” refers to the share of all seats in a legislature held by a party minus fifty percent. *Id.* “Vote Margin” is the share of votes a party received, minus fifty percent. *Id.* An electoral advantage exists when the efficiency gap is positive, and a negative efficiency gap score indicates a party faces an electoral disadvantage. *Id.* If one party controls redistricting and increases its efficiency gap measure in the next election, judges can infer that legislators drew district lines to gain a partisan advantage.

8. Transcript of Oral Argument, *supra* note 2, at 12.

9. Adam Liptak, *A Case for Math, Not ‘Gobbledygook,’ in Judging Partisan Voting Maps*, N.Y. TIMES (Jan. 16, 2018), <https://www.nytimes.com/2018/01/15/us/politics/gerrymandering-math.html>.

10. See Lincoln Caplan, *A Workable Democracy*, HARV. MAG. (2017), <https://harvardmagazine.com/2017/03/a-workable-democracy>.

11. Lee Epstein et al., *The Judicial Common Space*, 23 J.L. ECON. & ORG. 303, 318–20 (2007).

12. Michael A. Caciatore et al., *Opposing Ends of the Spectrum: Exploring Trust in Scientific and Religious Authorities*, 27 PUB. UNDERSTANDING SCI. 11, 19 (2016).

13. Feng Shi et al., *Millions of Online Book Co-purchases Reveal Partisan Differences in the Consumption of Science*, 1 NAT. HUM. BEHAV. 79 (2017).

14. Anthony N. Washburn & Linda J. Skitka, *Science Denial Across the Political Divide: Liberals and Conservatives Are Similarly Motivated to Deny Attitude-Inconsistent Science*, 1 SOC. PSYCHOL. & PERSONALITY SCI. 2 (2017) (finding individuals on the left and right are similarly motivated to discount scientific claims that challenge their worldview).

“Genes form the basis for hereditary traits in living organisms.”¹⁵ In debates over whether the death penalty deters crime, Professor John Donohue said, “Scalia was willing to cite work that was thoroughly refuted by an accepted scholarly institution, without feeling any need to buttress his position,” while rejecting the most rigorous research on the subject.¹⁶

Justice William Brennan outlined a hypothesis as to why Justices may not be the best consumers of scientific information: “It is unrealistic to expect either members of the judiciary or state officials to be well versed in the rigors of experimental or statistical technique.”¹⁷ Justice Brennan, unlike Justice Scalia, was a judicial liberal who majored in economics,¹⁸ and he cited social science in more opinions than any other Justice in the last sixty years.¹⁹ Ironically, however, when Justice Brennan issued this warning about judicial competencies concerning statistics, he proceeded to misstate a key scientific finding about gender, age, and the tendency to drink and drive.²⁰

This Article moves beyond the anecdotal and presents a more comprehensive qualitative and quantitative account of social science in Supreme Court decisions. To set the stage, Part I will provide a brief narrative of the role of social science in Supreme Court decisions from the *Lochner* Era through *Brown v. Board of Education*.²¹ While it would be tempting to conclude that social science evidence helped progressive advocates overturn conservative economic and civil rights precedents, the history is more complicated. As the social sciences became increasingly quantitative in their approach, Justices, who usually lack statistical training,²² are more likely to question the utility of social science. The Court also used junk science to justify their decisions, and this problem predates the rise of quantitative methodology.

15. *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 580 (2013). As Justice Scalia wrote, “I am unable to affirm [the fine details of molecular biology] on my own knowledge or even my own belief.” *Id.* at 596 (Scalia, J., concurring in part and concurring in the judgment).

16. Emily Bazelon, *Antonin Scalia Didn’t Trust Science*, N.Y. TIMES MAG., (Dec. 21, 2016), <https://www.nytimes.com/interactive/2016/12/21/magazine/the-lives-they-lived-antonin-scalia.html>.

17. *Craig v. Boren*, 429 U.S. 190, 204 (1976).

18. Clement E. Vose, *The National Consumers’ League and the Brandeis Brief*, 1 MIDWEST J. POL. SCI. 267, 277 (1957).

19. See *infra* Table 2, Section II.B.

20. See *infra* notes 112–118 and accompanying text.

21. 347 U.S. 483 (1954).

22. The exception to this might be Justice Harry Blackmun, who was a math major at Harvard University. See *infra* note 143 and accompanying text. Perhaps not so coincidentally, Justice Blackmun cited social science at the fifth highest rate among the thirty-four Justices included in my sample. See Table 2 *infra* Section II.B.

Part III will consider the competing incentives for Justices to make appeals to science, blending insights from the major theories of judicial behavior in political science. To test this theory, I collected an original dataset of Supreme Court citations to social science studies from the Warren Court through today. A series of multivariate logistic regression analyses indicates scientific references are more likely to appear in salient cases. Justices who majored in a scientific discipline as an undergraduate are more likely to cite social science than others.

Moreover, liberal Justices are significantly more likely to cite social science research than conservatives. The relationship between social science and judicial behavior is not just partisan; it is polarizing. The data indicate Justices on the Court’s left are more likely to invoke science in order to justify a liberal opinion, while Justices on the right are more likely to invoke science to justify a conservative opinion. The polarizing effect of social science references is even stronger in dissenting opinions. This Article will conclude by considering the normative implications of the findings and the need for future research.

I. A BRIEF HISTORY OF THE ROLE OF SOCIAL SCIENCE IN SUPREME COURT OPINIONS

The conventional account of social science influencing Supreme Court decisions typically begins with the “Brandeis Brief” in *Muller v. Oregon*.²³ The traditional narrative emphasizes how science provided objective evidence that mediated the desire of a conservative Court to uphold liberty of contract. The next major chapter in the relationship between social science and judicial decisionmaking focuses on Footnote 11 of *Brown v. Board of Education*.²⁴ Here again, we are made to think that social science provided objective evidence for progressive reformers to advance their agenda.

In this Section, I point out several flaws in this narrative. First, it ignores how poorly constructed many of these scientific studies were. Junk science sometimes caused progressive reformers to enact policies contrary to their stated goals, as in the case of the electric chair providing a more “humane” form of execution. Conservatives also used racist pseudo-science to persuade the Court to uphold segregation. Most importantly, it fails to account for the confusion and skepticism towards social science that many Supreme Court Justices have expressed in more recent times. I build on previous scholarship that argues that the New Deal changed both the priorities of the American state and the social sciences. As quantitative methods became the dominant

23. 208 U.S. 412 (1908). For a revisionist account of the role of the Brandeis Brief, see Noga Morag-Levine, *Facts, Formalism, and the Brandeis Brief: The Origins of a Myth*, 2013 U. ILL. L. REV. 59 (2013).

24. 347 U.S. at 494 n.11.

mode of analysis within the social sciences, judges became less able to evaluate the accuracy and usefulness of the science they cite.

A. *The Brandeis (-Goldmark-Frankfurter) Brief(s) During the Lochner Era*

According to the familiar story of the Brandeis Brief, the invalidation of a law regulating work hours for bakers in *Lochner v. New York*²⁵ forced progressive advocates to adopt a new strategy to overcome liberty of contract objections. Three years after *Lochner*, a challenge to a ten-hour workday law for women reached the Court. The state of Oregon turned to the National Consumers' League and its lead counsel, Louis Brandeis to argue the case. The brief Brandeis submitted, which was researched and written in about one month,²⁶ contained two pages of legal argument followed by 111 more pages of "new empirical evidence."²⁷

Brandeis also relied on the scientific evidence from his brief in a command performance during oral argument. According to one observer, "[Brandeis] not only *reached* the Court but he *dwarfed the Court*, because it was clear that here stood a man who knew infinitely more, and who cared infinitely more, for the vital daily rights of the people than the men who sat there sworn to protect them."²⁸ The strategy paid off. The Court unanimously upheld the Oregon statute and expressed admiration for the information contained in the brief.²⁹ The Court's decision in *Muller* is consistent with modern political science research, which finds amicus curiae briefs are influential because they provide Justices with information they otherwise would not have when deciding a case.³⁰

Perhaps Brandeis received his inspiration for this litigation strategy from Justice Harlan's dissenting opinion in *Lochner*. Justice Harlan's dissent, unlike that of Justice Holmes, recognized the legitimacy of liberty of contract. Justice Harlan, however, disagreed with the majority over whether the New York Bakeshop Act served a legitimate public purpose. Justice Har-

25. 198 U.S. 45 (1905).

26. Vose, *supra* note 18, at 277.

27. JOSEPHINE GOLDMARK, *FATIGUE AND EFFICIENCY: A STUDY IN INDUSTRY* 252 (1912).

28. Vose, *supra* note 18, at 280 (citing William Hitz to Felix Frankfurter, National Consumer League Papers (Dec. 1914)).

29. *Muller v. Oregon*, 208 U.S. 412, 419 (1908) (Brewer, J.) ("It may not be amiss . . . to notice the course of legislation as well as expressions of opinion from other than judicial sources. In the brief filed by Mr. Louis D. Brandeis, for the defendant in error, is a very copious collection of all these matters . . .").

30. Paul M. Collins Jr., *Friends of the Court: Examining the Influence of Amicus Curiae Participation in U.S. Supreme Court Litigation*, 38 L. & SOC'Y REV. 807 (2004).

lan believed bakers faced dangerous working conditions, relying on data provided in Professor Ludwig Hirt’s *Diseases of the Workers*.³¹ Bakers, according to Hirt, were “pale-faced” because they endured “intense heat,” and exposure to flour dust caused “inflammation of the lungs” and “running eyes.”³² Hirt concluded, “The labor of the bakers is among the hardest and most laborious imaginable”³³ None of this information was provided to the Court in New York’s brief.

If otherwise conservative Justices were willing to uphold laws backed by social science evidence, why did New York refuse to utilize this strategy in *Lochner*? Legal historian Paul Kens blames New York Attorney General Julius Mayer for being incompetent.³⁴ Professor Noga Morag-Levine, on the other hand, offers a more systematic explanation: the Court had traditionally deferred to legislative judgments about how a state chooses to exercise its police powers.³⁵ For example, in the 1873 *Slaughter-House Cases*,³⁶ the Court refused to question the wisdom of granting a monopoly to one New Orleans slaughterhouse. The state legislature enacted the law as a response to cholera outbreaks caused by animal remains that infected the city’s water supply.³⁷ Attorney General Mayer thought he would enjoy the same benefit of the doubt in *Lochner*.³⁸

The typical account of the Brandeis Brief is incomplete in four important respects. First, it belies the true authorship of the brief itself. While Brandeis deserves credit for adopting the strategy of providing scientific evidence, he did not conduct the research.³⁹ Justice Brewer should have paid homage to Brandeis’ sister-in-law, Josephine Goldmark, for the thoroughness of the *Muller* brief.⁴⁰ Goldmark, who served as chairman of the

31. *Lochner v. New York*, 198 U.S. 45, 70–71 (1905) (Harlan, J., dissenting) (citing LUDWIG HIRT, *DISEASES OF THE WORKERS* (1871)).

32. *Id.* at 70 (quoting LUDWIG HIRT, *DISEASES OF THE WORKER* (1871)).

33. *Id.* (quoting LUDWIG HIRT, *DISEASES OF THE WORKER* (1871)).

34. See PAUL KENS, *LOCHNER V. NEW YORK: ECONOMIC REGULATION ON TRIAL* 112–13 (1998).

35. Morag-Levine, *supra* note 23, at 87.

36. 83 U.S. 36 (1873).

37. See Andrew Hamm, *Barnett on Original Meaning and the Privileges or Immunities Clause*, SCOTUSBLOG, (Nov. 5, 2015 2:43 PM), <https://www.scotusblog.com/2015/11/barnett-on-original-meaning-and-the-privileges-and-immunities-clause/> (describing a lecture delivered by Professor Randy Barnett to the Supreme Court Historical Society).

38. Morag-Levine, *supra* note 23, at 85–88.

39. It is also inaccurate to give Brandeis credit for inventing this strategy. Most of the studies cited in the brief came from Europe, especially Great Britain, where reformers faced similar libertarian opposition to labor legislation. Scientific evidence reassured lawmakers that protecting workers was necessary for the public good, as opposed to paternalism or class-based rent-seeking. Morag-Levine, *supra* note 23, at 88–93.

40. See Vose, *supra* note 18, at 283 (noting Goldmark’s name did not appear on the *Muller* brief but was included (as second author) on the League’s subsequent briefs).

League's Committee on Legislation,⁴¹ supervised a staff of readers who scoured several libraries looking for relevant evidence, which she subsequently summarized and synthesized.⁴²

Second, the term "Brandeis Brief" incorrectly suggests the National Consumers' League only utilized this strategy once and for the sole benefit of the Court. In reality, the League produced similar briefs in more than a dozen state and federal cases, nine of which reached the United States Supreme Court.⁴³ The League continued to produce (even longer) briefs that were heavy on science and light on law long past Justice Louis Brandeis's 1916 appointment to the Supreme Court. Felix Frankfurter then took over as the League's lead counsel. The League also viewed its briefs as an opportunity to engage with a wider audience regarding the need for progressive reform. It sought grant funding to finance donations of its briefs to lawyers and university libraries.⁴⁴ The League's brief in *Adkins v. Children's Hospital* ran to 1138 pages and cost nearly \$7000 to print several hundred copies!⁴⁵

Third, the scientific information included in the *Muller* brief would not be considered reliable by modern standards. The brief typically included short, conclusory statements made by doctors and other experts without much context as to the study's design. These statements were often sweeping in their assessment yet lacking in specificity. Here is a typical example from a British physician, "The most common effect I have noticed of the long hours is general deterioration of health; very general symptoms which we medically attribute to over-action, and debility of the nervous system; that includes a great deal more than what is called nervous disease, such as indigestion, constipation, a general slackness, and a great many other indefinite symptoms."⁴⁶

The problem with substandard science is that it may provide a false justification for a legal conclusion. Consider Progressive-era reforms to the death penalty. In 1898, New York became the first state to mandate the use of the electric chair, following several botched hangings in the 1880s. Dr. Albert Southwick lobbied intensely for the law as a more humanitarian

41. *Id.* at 269.

42. *Id.* at 278.

43. *Id.* at 277 n.18 (citing *Morehead v. New York ex rel. Tipaldo*, 298 U.S. 587 (1936); *Radice v. New York*, 264 U.S. 292 (1924); *Adkins v. Children's Hosp.*, 261 U.S. 525 (1923); *Stettler v. O'Hara*, 243 U.S. 629 (1917) (per curiam); *Bunting v. Oregon*, 243 U.S. 426 (1917); *Bosley v. McLaughlin*, 236 U.S. 385 (1915); *Miller v. Wilson*, 236 U.S. 373 (1915); *Hawley v. Walker*, 232 U.S. 718 (1914) (per curiam); *Muller v. Oregon*, 208 U.S. 412 (1908); *Gainer v. Dohrman*, S.F. No. 10, 990, Sup. Ct. Calif. (1924); *People v. Elerding*, 98 N.E. 982 (Ill. 1912); *Ritchie v. Wayman*, 91 N.E. 695 (Ill. 1910); *People v. Charles Schweinler Press*, 108 N.E. 639 (N.Y. 1915)).

44. *Id.* at 287–88; Morag-Levine, *supra* note 23, at 92–93.

45. Vose, *supra* note 18, at 281.

46. Brief for Defendant in Error at 18–19, *Muller v. Oregon*, 208 U.S. 412 (1908) (No. 107) (quoting REPORT OF SELECT COMMITTEE ON SHOPS EARLY CLOSING BILL, BRITISH HOUSE OF COMMONS 215 (1895)).

method of execution.⁴⁷ The only evidence Dr. Southwick could offer in support of his conclusion was that he had witnessed the accidental death of a man who had touched electrical wires.⁴⁸

William Kemmler, the first person to be sentenced to death by electrocution, brought an Eighth Amendment challenge.⁴⁹ Thomas Edison testified at trial that a shock of 1000 volts of alternating current “would kill instantly, painlessly and in every case.” Edison admitted he was not an expert on bioelectricity, but his celebrity was more than persuasive.⁵⁰ According to one legal historian, Edison’s assertion was “sufficient evidence of its truth.”⁵¹

When Kemmler’s case reached the Supreme Court, Chief Justice Fuller wrote a unanimous opinion upholding the law.⁵² As in the *Slaughterhouse Cases*, the Court deferred to the judgment of the New York Legislature.⁵³ Any notion that the electric chair provided an instant, painless death was disproved immediately to any witness of Kemmler’s execution, which lasted eight horrific minutes.⁵⁴ As a result of the Supreme Court’s decision, many other inmates suffered similarly gruesome fates on the electric chair over the next century.⁵⁵

Finally, the traditional myth assumes only progressives marshaled social science to advance their agenda.⁵⁶ In 1908 (the same year as *Muller*), the Supreme Court upheld a Kentucky law that mandated segregation in private schools.⁵⁷ Berea College, the only racially integrated university in the state, challenged the law on the grounds it interfered with its freedom of contract.⁵⁸

47. Philip R. Nugent, *Pulling the Plug on the Electric Chair: The Unconstitutionality of Electrocution*, 2 WM. & MARY BILL RTS. J. 185, 190 (1993). Ironically, while science now supports the notion that electrocution is a painful, undignified way to die, opposition to the New York law came from those who thought the electric chair would undermine the dignity of science! Nicholas Ruddick, *Life and Death by Electricity in 1890: The Transfiguration of William Kemmler*, 21 J. AM. CULTURE 79, 80 (1998) (quoting an 1890 edition of *Scientific American* that opined it would be a “degradation of the noble science of electricity if it were brought down to so base a use as the killing of criminals”).

48. Nugent, *supra* note 47, at 190.

49. *Id.* at 190–91.

50. *Id.* at 191.

51. *Id.* at 191–92.

52. *In re Kemmler*, 136 U.S. 436 (1890).

53. *Id.* at 447.

54. For a graphic description of Kemmler’s demise, see Ruddick, *supra* note 47, at 83–86.

55. CRAIG BRANDON, *THE ELECTRIC CHAIR: AN UNNATURAL AMERICAN HISTORY* (2016).

56. See also PAUL A. LOMBARDO, *THREE GENERATIONS, NO IMBECILES: EUGENICS, THE SUPREME COURT, AND BUCK V. BELL* ix–xv (2008) (describing the use of eugenics as scientific “evidence” in forced sterilization cases).

57. *Berea College v. Kentucky*, 211 U.S. 45 (1908).

58. See Hans J. Hacker & William D. Blake, *The Neutrality Principle: The Hidden Yet Powerful Legal Axiom at Work in Brown versus Board of Education*, 8 BERKELEY J. AFR.-AM. L. & POL’Y 5, 18–20 (2006).

Kentucky countered that the law was needed to protect public health and safety under its police powers.⁵⁹

The State relied on a pseudo-scientific study that claimed black people were inherently less intelligent than white people. Dr. Sanford B. Hunt reached this conclusion on the basis that the average black person's brain weighed five ounces less than that of the average white person.⁶⁰ The brief also cited an 1867 Pennsylvania Supreme Court segregation opinion, which stated, "The natural separation of the races is therefore an undeniable fact, and all social organizations which lead to their amalgamation are repugnant to the law of nature. From social amalgamation it is but a step to illicit intercourse, and but another to intermarriage."⁶¹

Outside of the context of race, the *Lochner* Era Court became increasingly skeptical of whether state legislation achieved a constitutionally valid purpose. Similarly, the Court frequently doubted whether federal economic regulations were legitimately related to the Commerce Clause⁶² or Taxing and Spending Clause.⁶³ In 1937, after President Roosevelt threatened to pack the Court,⁶⁴ the Justices reversed course, upholding a Washington minimum wage law for women⁶⁵ and the National Labor Relations Act.⁶⁶

A year later, the Court went even further in redefining its role within the American constitutional system. In *United States v. Carolene Products*

59. *Id.* at 20–21.

60. *Id.* at 20.

61. *West Chester P.R. Co. v. Miles*, 55 Pa. 209, 213 (1867).

62. *See, e.g.*, *Hammer v. Dagenhart*, 247 U.S. 251 (1918) (striking down a federal ban on child labor).

63. *See, e.g.*, *United States v. Butler*, 297 U.S. 1 (1936) (striking down key provisions of the Agricultural Adjustment Act on states-rights grounds). *Butler* represents the one major pre-New Deal economic decision not overruled in a subsequent case following the Revolution of 1937. Instead, the Court distinguished *Butler* when it upheld the legitimacy of the Social Security Act in *Steward Machine Co. v. Davis*, 301 U.S. 548, 585 (1937) (holding "[t]he excise is not void as involving the coercion of the States in contravention of the Tenth Amendment"). Federal power appeared to circumscribe state authority in *United States v. Darby*, when the Court held the Tenth Amendment does not deprive "the national government of authority to resort to all means for the exercise of a granted power which are appropriate and plainly adapted to the permitted end." 312 U.S. 100, 124 (1941). However, *Darby* was a Commerce Clause case, and this principle was never extended to the Taxing and Spending Clause. As a result, I contend *Butler* and *Steward Machine Co.* formed the jurisprudential basis for the states' rights revival under the Rehnquist and Roberts Courts. For example, Chief Justice Roberts relies heavily on *Steward Machine Co.*'s distinction between the federal government's ability to pressure (not coerce) the states to strike the Medicaid provisions of the Affordable Care Act. *See Nat'l Fed'n of Indep. Bus. v. Sibelius*, 567 U.S. 519, 580–87 (2012); *see also* CASS R. SUNSTEIN, *THE PARTIAL CONSTITUTION* 292 (1993) ("[T]he unconstitutional conditions doctrine should be abandoned. . . . During the difficult transition from the common law system to the modern state, the doctrine represented an awkward and never fully explicated effort to protect constitutional rights in a dramatically different environment.").

64. Barry Cushman, *Inside the "Constitutional Revolution" of 1937*, *SUP. CT. REV.* 367, 381 (2016).

65. *West Coast Hotel Co. v. Parrish*, 300 U.S. 379 (1937).

66. *NLRB v. Jones & Laughlin Steel Corp.*, 301 U.S. 1 (1937).

Co.,⁶⁷ the Court upheld a federal law banning the interstate shipment of “filled milk”—milk mixed with other oils or compounds.⁶⁸ According to Footnote 4 of the opinion, “prejudice against discrete and insular minorities” may demand “searching judicial inquiry.”⁶⁹ However, Justice Stone argued courts should be more deferential to elected officials in other types of cases. “[R]egulatory legislation affecting ordinary commercial transactions,” Justice Stone wrote, “is not to be pronounced unconstitutional unless in the light of the facts made known or generally assumed it is of such a character as to preclude the assumption that it rests upon some rational basis within the knowledge and experience of the legislators.”⁷⁰ Footnote 4, thus, represented a reversal of the Court’s *Lochner* Era approach to economic rights and formed the basis for the Court’s modern scrutiny system in constitutional review cases.

B. Post-New Deal Developments in Law and Social Science

Why did the Supreme Court become more deferential when evaluating economic regulations? One could argue that the modern rational basis test was not so modern, as it marked a return to the Court’s pre-*Lochner* Era jurisprudence.⁷¹ Professor Bruce Ackerman, on the other hand, has argued Footnote 4 was an important part of the New Deal constitutional revolution, expanding the legitimate reach of the federal government.⁷² Arguably, the Court’s new jurisprudence was also a function of its new personnel. By 1938, two of the conservative “Four Horsemen,”⁷³ Justices Van Devanter and Sutherland, had retired and were replaced by pro-New Deal Justices Hugo Black and Stanley Reed.

I contend this jurisprudential shift also represents a new judicial understanding of the complexity of social problems and the institutional competencies required to solve them. Footnote 4 recognized that judges lacked the training to diagnose economic problems and evaluate potential solutions to them. The executive and legislative branches are large enough to hire policy experts who can leverage social science effectively. For policy advice, Roo-

67. 304 U.S. 144 (1938).

68. *Id.* at 145 n.1.

69. *Id.* at 153 n.4.

70. *Id.* at 152.

71. See *supra* notes 31–33 and accompanying text.

72. BRUCE ACKERMAN, *WE THE PEOPLE: FOUNDATIONS* 120 (1991) (“*Carolene* should be numbered amongst the *transformative opinions* which the modern republic uses to memorialize the constitutional solutions of the 1930’s.”).

73. See BURT SOLOMON, *FDR V. THE CONSTITUTION: THE COURT-PACKING FIGHT AND THE TRIUMPH OF DEMOCRACY* 49 (2009).

sevelt famously relied on his “brain trust”: Raymond Moley (a political economist and law professor), Rex Tugwell (an economics professor), and Adolph Berle (a lawyer and business professor).⁷⁴

As the Supreme Court reoriented itself to post-New Deal America, so did the social sciences. This Article focuses mostly on developments within political science, but other scholars have described similar transformations across related disciplines.⁷⁵ At the beginning of the twentieth century, political scientists valued scholarship not simply for its own sake, but as a tool to solve real-world political problems. Research within the discipline often demonstrated “that the . . . system as set forth in the law is not always the same as the actual system.”⁷⁶

The reform-oriented mission of political science attracted both university professors and educated laypeople. When the American Political Science Association launched in 1903, only twenty percent of its members were “professors and teachers.”⁷⁷ Elected officials also sought out political scientists for advice. For example, President Roosevelt settled on court packing as a response to the Supreme Court’s opposition to the New Deal after extensive consultations with Princeton University Professor Edward Corwin.⁷⁸

Beginning in the 1920s, some political scientists began protesting against the dominant research tradition, using historical and other interpretivist methods to describe and analyze how governing institutions do and should function. They sought to redefine the object of political science as “formulating and testing hypotheses, concerning uniformities of behavior in different institutional settings.”⁷⁹ To accomplish this goal, according to a

74. ROBERT DALLEK, FRANKLIN D. ROOSEVELT: A POLITICAL LIFE 117–19 (2017). Not that elected officials always make decisions using considered scientific judgment. On one occasion in 1933, President Roosevelt told Treasury Secretary Henry Morgenthau he wanted to raise gold prices by twenty-one cents. When Morgenthau inquired why, Roosevelt replied, “Because ‘three times seven’ is a lucky number.” *Id.* at 174. Political scientists have noted that decisions like these continue to this day. BRYAN D. JONES & WALTER WILLIAMS, THE POLITICS OF BAD IDEAS: THE GREAT TAX CUT DELUSION AND THE DECLINE OF GOOD GOVERNMENT IN AMERICA v–vi (2008).

75. *See, e.g.*, DOROTHY ROSS, THE ORIGINS OF AMERICAN SOCIAL SCIENCE 390 (1991) (“The sciences of liberal change that were forged during the second decade of [the twentieth] century captured substantial support in social science disciplines. . . . The self-conscious search for scientific method . . . transformed the larger disciplinary traditions.”); B.F. Skinner, *Behaviorism at Fifty*, 140 SCIENCE 951, 957 (1963) (discussing how “psychology has long been used for purposes of explanation” across the social sciences.).

76. ROSS, *supra* note 75, at 274 (quoting FRANK J. GOODNOW, POLITICS AND ADMINISTRATION: A STUDY IN GOVERNMENT (1905)).

77. Theodore J. Lowi, *The State in Political Science: How We Become What We Study*, 86 AM. POL. SCI. REV. 1, 1 (1992) (quoting ALBERT SOMIT & JOSEPH TANNENHAUS, THE DEVELOPMENT OF POLITICAL SCIENCE: FROM BURGESS TO BEHAVIORALISM 55 (1967)).

78. SOLOMON, *supra* note 73, at 90.

79. Robert A. Dahl, *The Behavioral Approach in Political Science: Epitaph for a Monument to a Successful Protest*, 55 AM. POL. SCI. REV. 763, 764 (1961) (emphasis omitted) (quoting ANNUAL REPORT OF THE SOCIAL SCIENCE RESEARCH COUNCIL (1945)). Within political science,

1951 publication, a political behavioralist should seek answers to questions “in quantitative terms if [they] can and in qualitative terms if [they] must.”⁸⁰ While statistical theory was well-developed by the late nineteenth century,⁸¹ post-World War II technological advances made it easier (and cheaper) for political scientists to analyze larger datasets with more advanced statistical techniques.⁸²

Political scientist Theodore Lowi poses another rationale for behavioralism becoming dominant: it co-evolved with the New Deal. “Science is an inherent part of the new, bureaucratized state,” Lowi argued, because of the post-New Deal commitment to making policy based on “scientific decision making.”⁸³ Within political science, Lowi argued that the subfields of political behavior, public policy, and formal theory became increasingly popular because of their “compatibility with bureaucratic thought-ways.”⁸⁴ These disciplinary and governance changes required a commitment to quantitative methods because, as Professor Karl Manheim wrote, “Bureaucratic thought is permeated by measurement.”⁸⁵

The post-New Deal approaches to social science and law famously intersected in Footnote 11 of *Brown v. Board of Education*.⁸⁶ Chief Justice Warren included the footnote in support of his conclusion, “Separate educational facilities are inherently unequal.”⁸⁷ Although this footnote subsequently became a major source of controversy,⁸⁸ Chief Justice Warren said he included it as merely an afterthought.⁸⁹ This rationale is entirely plausible. As noted in Part II of this Article, *Brown v. Board of Education* is the only opinion in which Chief Justice Warren cites social scientific research.⁹⁰ The

behavioralists study, among other phenomena, why individuals join political parties, vote for candidates, and hold opinions on political issues. See THE OXFORD HANDBOOK OF POLITICAL BEHAVIOR (Russell J. Dalton & Hans-Dieter Klingemann eds., 2009).

80. Dahl, *supra* note 79, at 767–68 (emphasis omitted) (quoting David Truman, *Items*, SOC. SCI. RES. COUNCIL 37 (1951)).

81. Lowi, *supra* note 77, at 3.

82. John M. Chambers, *Statistical Computing: History and Trends*, 34 AM. STAT’N 238, 238 (1980) (“[R]adically cheaper and smaller devices for processing and memory . . . are certain to provide major opportunities and challenges for the use of computers in statistics.”).

83. Lowi, *supra* note 77, at 3.

84. *Id.* Formal theory refers to the use of game theory as a method to derive hypotheses under rationalistic assumptions. See Paul E. Johnson, *Formal Theories of Politics: Mathematical Modeling in Political Science*, 12 MATHEMATICAL AND COMPUTER MODELLING 397 (1989).

85. Lowi, *supra* note 77, at 3 (quoting KARL MANNHEIM, *IDEOLOGY AND UTOPIA* 167 (1936)).

86. 347 U.S. 483, 494 n.11 (1954).

87. *Id.* at 495.

88. See Sanjay Mody, *Brown Footnote Eleven in Historical Context: Social Science and the Supreme Court’s Quest for Legitimacy*, 54 STAN. L. REV. 793, 803–14 (2002) (describing the ongoing controversy over Footnote 11).

89. RICHARD KLUGER, *SIMPLE JUSTICE: THE HISTORY OF BROWN V. BOARD OF EDUCATION AND BLACK AMERICA’S STRUGGLE FOR EQUALITY* 706 (2004) (noting Warren later incredulously stated, “It was only a note, after all.”).

90. See *infra* Table 2, Section II.B.

footnote consisted of seven references to studies conducted by both white and black scholars. Two of the references were surveys of social scientists who largely agreed segregation harms the development of black students.⁹¹

Most prominently, Footnote 11 included two references to the studies (the “Doll Studies”) conducted by Dr. Kenneth Clark, a City University of New York psychologist.⁹² Dr. Clark interviewed male and female black children between the ages of three and seven. Each child viewed two otherwise identical infant dolls, one of which was white, the other black. Dr. Clark requested the children show him a doll that matched a qualification, including “the doll you like best,” the “nice doll,” the doll that “looks bad,” and the doll that “looks like you.” Across each age group, children were significantly more likely to associate the white doll with positive characteristics and the black doll with looking “bad.”⁹³

The notoriety Footnote 11 has achieved makes its origin story even more interesting.⁹⁴ When the NAACP was preparing to bring *Brown* to the Court, they approached Dr. Clark for assistance in grounding their legal argument in social science data.⁹⁵ The NAACP wanted to counter Justice Brown’s observation in *Plessy v. Ferguson*⁹⁶ that segregation only creates a badge of inferiority if “the colored race chooses to put that construction upon it.”⁹⁷ Dr. Clark’s research could, as he put it, “demonstrate subtle or psychological damage to black youngsters from segregation.”⁹⁸ The Appendix to the NAACP’s briefs analyzed data from forty-nine studies conducted by Dr. Clark and many other scientists.⁹⁹

That educational segregation existed in Topeka, Kansas, was easy to diagnose, as there was a state statute requiring separate school systems.¹⁰⁰ In subsequent cases, states and school boards seeking to avoid compliance with

91. 347 U.S. at 494 n.11 (citing Isidor Chein, *What Are the Psychological Effects of Segregation Under Conditions of Equal Facilities?*, 3 INT’L J. OPINION & ATTITUDE RES. 229–34 (1949); Max Deutscher & Isidor Chein, *The Psychological Effects of Enforced Segregation: A Survey of Social Science Opinion*, 26 J. PSYCHOL. 259 (1948)).

92. *Id.* (citing KENNETH B. CLARK, EFFECT OF PREJUDICE AND DISCRIMINATION ON PERSONALITY DEVELOPMENT (1950)).

93. Darlene Powell-Hopson & Derek S. Hopson, *Implications of Doll Color Preferences Among Black Preschool Children and White Preschool Children*, 14 J. BLACK PSYCHOL. 57, 58 (1988).

94. *E.g.*, WHAT *BROWN V. BOARD OF EDUCATION* SHOULD HAVE SAID: THE NATION’S TOP LEGAL EXPERTS REWRITE AMERICA’S LANDMARK CIVIL RIGHTS DECISION 50–51 (Jack Balkin ed., 2001).

95. MARK A. CHESLER, JOSEPH SANDERS & DEBRA S. KALMUSS, SOCIAL SCIENCE IN COURT: MOBILIZING EXPERTS IN THE SCHOOL DESEGREGATION CASES 17–19 (1988).

96. 163 U.S. 537 (1896).

97. *Id.* at 551.

98. CHESLER ET AL., *supra* note 95, at 19.

99. Appendix to Appellants’ Briefs at 20–24, *Brown v. Bd. of Educ.*, 347 U.S. 483 (1954) (Nos. 8, 101, 191).

100. *See Brown*, 347 U.S. at 486 n.1.

Brown became more sophisticated in hiding their discriminatory acts. Consequently, plaintiffs relied on more complex statistics to prove their case. As part of the decree to integrate public schools in Washington, D.C., the plaintiffs asked the court to equalize the per-pupil spending on every item in the school budget.¹⁰¹ Both the plaintiff and the school board hired economists to argue whether neighborhood income in the city was positively or negatively correlated with school expenditures. The answer depended upon which statistical technique was employed: Pearson correlation or Spearman correlation.¹⁰²

Judge J. Skelly Wright became increasingly frustrated with the scientific data debated in the lawsuit. When he issued his opinion, he declared, “[T]he unfortunate if inevitable tendency has been to lose sight of the disadvantaged young students on whose behalf this suit was first brought in an overgrown garden of numbers and charts and jargon like ‘standard deviation of the variable,’ statistical ‘significance,’ and ‘Pearson product moment correlations.’”¹⁰³ Instead, Judge Wright stated, “The conclusion I reach is based upon burden of proof, and upon straightforward moral and constitutional arithmetic.”¹⁰⁴ Constitutional arithmetic may seem straightforward to some judges, but debates over appropriate statistical techniques in the social sciences today are even more complex than which form of a correlation coefficient an analyst should employ.

C. Judicial Misunderstanding of Science and the Potential for Ideologically-Motivated Reasoning

Josephine Goldmark, Justice Louis Brandeis, and Justice Felix Frankfurter wanted to mediate the *Lochner* Court’s conservatism, using scientific

101. *Hobson v. Hansen*, 327 F. Supp. 844, 844 (D.D.C. 1971).

102. DONALD L. HOROWITZ, *THE COURTS AND SOCIAL POLICY* 126 (1977). A correlation coefficient measures the extent to which two variables tend to change together. Correlation values of one or negative one signify a perfect (positive or negative) relationship between the two variables, regardless of whether an analysis uses the Pearson or Spearman technique. A Pearson correlation evaluates the linear relationship between two continuous variables, whereas a Spearman correlation evaluates a monotonic relationship between two continuous variables. A monotonic relationship is one in which the variables tend to change together, but not necessarily at a constant rate. To illustrate the difference, consider a series of data points along a J-shape that look like this J . There is no way to accurately fit a straight line through that symbol so the Pearson correlation would be slightly less than one. The Spearman correlation, however, would be one because a J-shaped line would fit the J-shaped data more accurately. One advantage of the Spearman correlation is that it is less sensitive to outlier data points because it has more flexibility in the patterns it measures. However, since most quantitative research in social science is based on finding linear relationships between variables, Pearson correlations are more commonly used. For a more mathematically rigorous explanation of the similarities and differences of these two concepts, see KATHLEEN F. WEAVER ET AL., *AN INTRODUCTION TO STATISTICAL ANALYSIS IN RESEARCH: WITH APPLICATIONS IN THE BIOLOGICAL AND LIFE SCIENCES* 435–71 (2018).

103. *Hobson*, 327 F. Supp. at 859.

104. *Id.*

evidence to steer the Justices to a legally correct (liberal) outcome in labor cases. History has demonstrated, however, that as quantitative social science becomes more methodologically rigorous, it becomes more likely that judges, who lack statistical training, may be unable to evaluate the quality of the research they cite. Moreover, judges may not understand whether the scientific findings support the legal conclusions they draw from them.¹⁰⁵ If these mistakes occur frequently, social science is unlikely to have this mediating effect on judicial decisionmaking. Instead, social science could become another tool fueling ideological polarization on the Court.¹⁰⁶

Chief Justice Warren is arguably guilty of making both types of mistakes in Footnote 11. Even by the scientific standards of the mid-twentieth century, the research cited in *Brown* was not particularly well-designed. For example, surveying social scientists about their views on segregation is not nearly as helpful as administering a survey to black (and white) children. Other social scientists criticized the question wording and sampling procedures of these surveys.¹⁰⁷

Dr. Clark's Doll Studies suffered from a small sample size and no control group.¹⁰⁸ It is also possible that Dr. Clark over-concluded from his data. For example, only sixty-one percent of the three-year-old respondents correctly identified the brown doll as the one that "looks like you."¹⁰⁹ If nearly half the sample cannot relate their skin color to the skin color of the doll, what does it mean when these children associate the white doll as being "the nice doll"?

More importantly, Justice Warren cited this research in support of the proposition that state-sanctioned discrimination psychologically harms black children. However, the Doll Studies did not identify the causal mechanism that creates this lack of self-esteem. Other research undermined the assumption that state-mandated segregation created this effect. An earlier Doll Study conducted by Dr. Clark compared the behavior of black children in Arkansas to those in Massachusetts, where *de jure* school segregation did not exist.¹¹⁰ The black children in Massachusetts were even more likely to prefer the white doll than the children in Arkansas.¹¹¹

105. See also Michael Rustad & Thomas Koenig, *The Supreme Court and Junk Social Science: Selective Distortion in Amicus Briefs*, 72 N.C. L. REV. 91 (1993).

106. For a persuasive account on the rise of ideological polarization on the Court, see NEAL DEVINS & LAWRENCE BAUM, *THE COMPANY THEY KEEP: HOW PARTISAN DIVISIONS CAME TO THE SUPREME COURT* 1–14 (2019).

107. CHESLER ET AL., *supra* note 95, at 23.

108. Michael Heise, *Brown v. Board of Education, Footnote 11, and Multidisciplinarity*, 90 CORNELL L. REV. 279, 293–94 (2004).

109. Powell-Hopson & Hopson, *supra* note 93, at 58.

110. CHESLER ET AL., *supra* note 95, at 23.

111. *Id.*

Even Justices who enjoy engaging with science may badly misinterpret it. According to a former law clerk, Justice William Brennan had a “certain fascination with science and technology,”¹¹² and he cited scientific studies in more opinions than any other Justice analyzed in this Article.¹¹³ Nonetheless, his enthusiasm did not serve him well in *Craig v. Boren*,¹¹⁴ a challenge to an Oklahoma law that set the legal age for purchasing so-called “3.2% beer” at eighteen for women and twenty-one for men. The State justified the law as a means of reducing drunk driving and highway accidents, but the Court invalidated the law on Equal Protection grounds by a 7-2 vote.

Justice Brennan’s majority opinion doubted both the accuracy and relevance of scientific evidence the State offered in defense of the law.¹¹⁵ Regarding the most relevant scientific information, Justice Brennan wrote,

[T]he statistics broadly establish that [0].18% of females and 2% of males [aged eighteen to twenty years old in the state of Oklahoma] were arrested for [driving under the influence of alcohol in September-December, 1973]. While such a disparity is not trivial in a statistical sense, it hardly can form the basis for employment of a gender line as a classifying device. Certainly[,] if maleness is to serve as a proxy for drinking and driving, a correlation of 2% must be considered an unduly tenuous “fit.”¹¹⁶

Justice Brennan made three major mistakes in this passage. First of all, there is no correlational analysis taking place, so the term “correlation” is not appropriate. Second, he mistakes the concepts of statistical significance, which tests whether a finding is a “statistical fluke” caused by measurement error, for substantive significance, which evaluates whether a finding has real-world import.¹¹⁷ Finally, the substantive significance of the difference in arrest rates for men and women is massive, not merely “not trivial.” Ironically, Justice Rehnquist, who cites science in only 0.7 percent of his opinions,¹¹⁸ provides a much better interpretation of this finding in his dissent: “[M]ales in the [eighteen to twenty year old] age group were arrested for

112. Dean M. Hashimoto, *Justice Brennan’s Use of Scientific and Empirical Evidence in Constitutional and Administrative Law*, 32 B.C. L. REV. 739, 740 (1991).

113. See *infra* Table 2, Section II.B.

114. 429 U.S. 1904 (1976).

115. *Id.* at 199–204.

116. *Id.* at 201–02.

117. In *Craig*, one cannot conclude whether the gender difference in arrest rates is statistically significant because, without additional information from other time periods, we do not know if the arrest data from September to December 1973 was anomalous. For a more detailed explanation of the difference between the concepts of statistical and substantive significance, see Herbert F. Weisberg, *Substantive Significance*, in 3 THE SAGE ENCYCLOPEDIA OF SOCIAL SCIENCE RESEARCH METHODS 1099 (Michael S. Lewis-Beck, Alan Bryman & Tim Futing Liao eds., 2004).

118. See *infra* Table 2, Section II.B.

'driving under the influence' almost [eighteen] times as often as their female counterparts."¹¹⁹

Justice Brennan formed a bizarre conclusion concerning the limitations of the State's data. He claimed the higher arrest rate for men aged eighteen to twenty years old may be evidence of "the relative futility of controlling driving behavior by the 3.2% beer statute and like legislation."¹²⁰ This seems equivalent to saying that since men are disproportionately more likely to be arrested for committing murder,¹²¹ the laws punishing murder are futile, and, by extension, raise Equal Protection concerns. Moreover, it is puzzling as to why Justice Brennan would spend several pages critiquing the State's data before stating, "It is unrealistic to expect either members of the judiciary or state officials to be well versed in the rigors of experimental or statistical technique."¹²²

Professor Ronald Dworkin echoed this perspective towards quantitative data in judicial opinions.¹²³ However, he also argued judges should rely on qualitative studies in their decisionmaking. He noted, "Controversial causal judgments based on statistical theory lie outside the normal competence of courts But the role of interpretive judgment should not be reduced."¹²⁴ Judges, Dworkin argued, are well-positioned to understand the quality and implications of an anthropology study that, for example, evaluates whether a rain dance in an indigenous tribe "is religious rather than technological in its meaning."¹²⁵

Dworkin hoped to recreate the relationship between social science and judging that existed when Goldmark, Justice Brandeis, and Justice Frankfurter were writing their briefs. This plea failed to recognize that one cannot go home again. Absent a social scientific revolution that reinvigorates qualitative methods as the dominant form of scholarship (or a revolution in legal education),¹²⁶ using social science in judicial decisions will be fraught with

119. *Craig*, 429 U.S. at 223 (Rehnquist, J., dissenting).

120. *Id.*

121. James Alan Fox & Emma E. Fridel, *Gender Differences in Patterns and Trends in U.S. Homicide, 1976-2015*, 4 *VIOLENCE & GENDER* 37, 37-43 (2017).

122. 429 U.S. at 204.

123. Ronald Dworkin, *Social Sciences and Constitutional Rights—The Consequences of Uncertainty*, 6 *J.L. & EDUC.* 3, 12 (1977).

124. *Id.*

125. *Id.* at 4. The concept of judges-as-anthropologists plays a major role in Dworkin's subsequent work on constructivist legal theory. See RONALD DWORIN, *LAW'S EMPIRE* 45-86 (1986).

126. Such a revolution would be welcomed by some legal commentators. OLIVER WENDELL HOLMES JR., *THE PATH OF THE LAW* 28 (2007) ("For the rational study of the law the blackletter man may be the man of the present, but the man of the future is the man of statistics and the master of economics."); Richard A. Posner, *The Present Situation in Legal Scholarship*, 90 *YALE L.J.* 1113, 1129 (1981) ("Leading law schools should seek to foster social scientific research on the legal system").

empirical and normative difficulties. As discussed in the next section, ordinary citizens do not fully understand how the scientific method works. This lack of understanding creates a willingness to support only those scientific conclusions that comport with their political worldview. If judges are similarly “in over their heads” when it comes to evaluating social science, they may fall victim to the same kind of ideologically-motivated reasoning.

II. USING SOCIAL SCIENCE TO PREDICT THE USE OF SOCIAL SCIENCE IN SUPREME COURT OPINIONS

Why might Supreme Court Justices make scientific appeals? This Part considers different incentives that make some Justices more likely to reference scientific studies than others and make some cases more likely to feature scientific appeals. Finally, this Part considers whether science might polarize or mediate the effect of ideology on judicial decisionmaking. The major theories of judicial behavior within political science inform the development of these hypotheses. Section II.A discusses the three major theories of judicial behavior: (1) the attitudinal model; (2) the strategic model; and (3) the legal model. The attitudinal model forms the basis for the “Judicial Liberalism Hypothesis” and “Science Major Hypothesis.” The strategic model of judicial behavior yields the “Case Salience Hypothesis” and the “Ideological Polarization Hypothesis,” while the “Ideological Moderation Hypothesis” derives from the legal model. Finally, Section II.B, provides background on the data gathered to test these hypotheses.

A. *Theory and Hypotheses*

1. *The Attitudinal Model of Judicial Decisionmaking*

The behavioral revolution, described in Section I.B, took hold more quickly in some subfields of political science than others. The last to embrace the behavioral approach was public law. Professor Harold Spaeth complained about the state of scientific research on the Court in the mid-1960s, arguing, “Until recent years, analysis of Supreme Court . . . decision-making had hewed exclusively to the line of literary criticism; it was subjective, impressionistic, and nonreplicable.”¹²⁷ Spaeth, along with Professor Jeffrey

127. HAROLD J. SPAETH, *THE WARREN COURT: CASES AND COMMENTARY* 15 (1966). Ironically, the attitudinal model that Professor Harold Spaeth eventually developed along with Professor Jeffrey Segal is subject to the same criticisms. In many cases, classifying a particular opinion as “liberal or conservative” is quite subjective, and the initial measure of judicial ideology proposed by attitudinalists is based on the subjective interpretations of newspaper commentators. JEFFREY A. SEGAL & HAROLD J. SPAETH, *THE SUPREME COURT AND THE ATTITUDINAL MODEL REVISITED* 321–24 (2002). Second, the attitudinal model does not claim ideology is one important variable in explaining judicial decisions. Segal and Spaeth instead claim ideology is the only relevant variable. *Id.* at 324–25 (“[I]n predicting votes, one is clearly better off knowing the attitudes of the [J]ustices than the facts of the case.”). Any statistical model in which only one independent variable predicts

Segal, developed the attitudinal model of judicial behavior, which assumes Justices are single-minded seekers of legal policy. Each Justice's ideology determines what kind of legal policy they seek.¹²⁸ Segal and Spaeth, writing in 2002, conclude, "Simply put, Rehnquist votes the way he does because he is extremely conservative; [Thurgood] Marshall voted the way he did because he was extremely liberal."¹²⁹

The attitudinal model suggests rival hypotheses when it comes to the relationship between a Justice's ideology and his or her willingness to make scientific appeals. Proponents of the attitudinal model view the content of judicial opinions as nothing more than a post hoc rationalization of a Justice's ideology. From this standpoint, ideology may not have any predictable relationship to the decision to cite science because science does not provide ideologically-reliable answers to social or legal problems. Justices on both the left and the right will cite science that supports their worldview.

One fascinating new public opinion study supports the notion that individuals seek scientific information that comports with their ideological worldview. Researchers analyzed Amazon transactions in which an individual purchased a "political" book (subsequently classified as either liberal or conservative) and at least one other book. The study did not find Democrats were more interested in science as a companion book purchase compared to Republicans. In fact, science books were co-purchased at a higher rate than any other genre. The science book purchasing habits of Democrats and Republicans were different, however, in regard to the scientific fields and perspectives within those fields they selected. In other words, it appears as though both conservatives and liberals who enjoy reading are open to learning more about science, so long as it confirms their underlying worldview.¹³⁰

outcomes on a dependent variable is, by definition, impressionistic. Finally, Segal and Spaeth acknowledge the attitudinal model cannot explain unanimous Supreme Court votes. *Id.* at 343 n.81. Thus, their model is non-replicable in roughly thirty-six percent of Supreme Court cases every term. Sarah Tuberville & Anthony Marcum, *Those 5-to-4 Decisions on the Supreme Court? 9 to 0 Is Far More Common.*, WASH. POST (June 28, 2018), <https://www.washingtonpost.com/news/posteverything/wp/2018/06/28/those-5-4-decisions-on-the-supreme-court-9-0-is-far-more-common/>.

128. SEGAL & SPAETH, *supra* note 127.

129. *Id.* at 86.

130. Shi et al., *supra* note 13. One caveat to the generalizability of this study is that it is limited to individuals who want to learn about both politics and science. Individuals with higher levels of political knowledge behave with much greater sophistication than less informed voters. See MICHAEL X. DELLI CARPINI & SCOTT KEETER, *WHAT AMERICANS KNOW ABOUT POLITICS AND WHY IT MATTERS* (1996).

On the other hand, other studies have found that conservative citizens are less trusting of scientists in general¹³¹ and skeptical of evidence supporting scientific issues like climate change¹³² and evolution.¹³³ One possible causal mechanism is that differences in personality types have ideological consequences. Compared to conservatives, liberals tend to be significantly more open to new information and experiences,¹³⁴ one of the so-called “Big-Five” personality traits.¹³⁵ Individuals with higher openness scores may trust scientists more because they are more curious about scientific questions. Judicial politics scholars have found a similar relationship between openness as a personality trait and liberalism among Supreme Court Justices.¹³⁶ Thus, I predict liberal Justices will be more likely to cite science in their opinions than conservatives (Judicial Liberalism Hypothesis).

Ideology is a product of a Justice’s demographic characteristics (for example, race, gender, religion, and age) and life experiences (for example, economic status, education, or prior work experience). These social forces can also exert an independent effect on judicial decisionmaking. For example, Catholic Supreme Court Justices tend to support the Catholic position on legal issues, even after controlling for judicial ideology.¹³⁷ Judicial politics scholars, however, have not devoted much attention to the effect of a Justice’s undergraduate major.

Justices who have greater familiarity with the scientific method as a result of their education may feel more comfortable referencing social science in their opinions.¹³⁸ One study found that high school math performance did not affect what major a college student selected.¹³⁹ Rather, the presence of negative feelings towards math made students significantly more likely to choose a humanities major over a social science field. If a negative affect

131. Cacciatore et al., *supra* note 12, at 18.

132. Ana-Maria Bliuc et al., *Public Division About Climate Change Rooted in Conflicting Socio-political Identities*, 5 NAT. CLIMATE CHANGE 226–29 (2015).

133. Jonathan P. Hill, *Rejecting Evolution: The Role of Religion, Education, and Social Networks*, 53 J. SCI. STUDY RELIGION 575, 576 (2014).

134. See, e.g., Jan-Emmanuel De Neve, *Personality, Childhood Experience, and Political Ideology*, 36 POL. PSYCHOL. 55, 55 (2014).

135. See Lewis R. Goldberg, *An Alternative “Description of Personality”: The Big-Five Factor Structure*, 59 J. PERSONALITY & SOC. PSYCHOL. 1216, 1217 (1990).

136. MATTHEW E. K. HALL, *WHAT JUSTICES WANT: GOALS AND PERSONALITY ON THE U.S. SUPREME COURT* 47–48 (2018).

137. William Blake, *God Save This Honorable Court: Religion as a Source of Judicial Policy Preferences*, 65 POL. RES. Q. 814, 814–15 (2012).

138. This would be consistent with a study that found science majors are significantly more knowledgeable about climate change than college graduates who majored in other fields. Joanna K. Huxster, Ximena Uribe-Zarain & Willett Kempton, *Undergraduate Understanding of Climate Change: The Influences of College Major and Environmental Group Membership on Survey Knowledge Scores*, 46 J. ENVTL. EDUC. 149, 158 (2015).

139. Yingyi Ma, *Family Socioeconomic Status, Parental Involvement, and College Major Choices—Gender, Race/Ethnic, and Nativity Patterns*, 52 SOC. PERSP. 211, 222–23 (2009).

towards math is long lasting, it could make people more reticent to engage with quantitative scientific research later in life. The Science Major Hypothesis predicts that Justices who earned a bachelor's degree in a scientific field will be more likely to invoke science in their opinions than Justices who studied other subjects.¹⁴⁰

The following Justices, whose behavior is analyzed in Section III, completed a degree in a social science field or mathematics:¹⁴¹ Samuel Alito (Public and International Affairs),¹⁴² Harry Blackmun (Math),¹⁴³ William Brennan (Economics),¹⁴⁴ Stephen Breyer (Politics, Philosophy, and Economics),¹⁴⁵ William Douglas (Economics),¹⁴⁶ Neil Gorsuch (Political Science),¹⁴⁷ John Harlan (Government),¹⁴⁸ Anthony Kennedy (Political Science),¹⁴⁹ Sandra Day O'Connor (Economics),¹⁵⁰ Stanley Reed (Economics),¹⁵¹ William Rehnquist (Political Science),¹⁵² Earl Warren (Political Science),¹⁵³ Byron

140. Interestingly, Ronald Reagan gave a speech in which he appeared to link the Judicial Liberalism Hypothesis and the Science Major Hypothesis. At a 1986 event in North Carolina, he stated Democrats "allow drugs, thugs and hoodlums to pervade society by placing a bunch of sociology majors on the bench." Ronald J. Ostrow & James Gerstenzang, *Reagan, Bork Foe in Sharp Exchange: President's Accusation of Dishonesty Hit by Sen. Sanford as 'Slandorous'*, L.A. TIMES (Oct. 15, 1987), <https://www.latimes.com/archives/la-xpm-1987-10-15-mn-14322-story.html>.

141. Justice Hugo Black is not included on this list. While he attended medical school for one year, Justice Black did not complete his degree. ROGER K. NEWMAN, HUGO BLACK: A BIOGRAPHY 17 (1994).

142. Samuel Alito, BALLOTPEDIA, https://ballotpedia.org/Samuel_Alito (last visited Apr. 16, 2019).

143. Paul Nelson, *Blackmun, Harry A. (1908–1999)*, MNOPIEDIA (Oct. 18, 2017), <http://www.mnopedia.org/person/blackmun-harry-1908-1999>.

144. See NAT HENTOFF, LIVING THE BILL OF RIGHTS: HOW TO BE AN AUTHENTIC AMERICAN 31 (1999).

145. Caplan, *supra* note 10.

146. *Building Upon a Legacy of Law*, WHITMAN MAG. (July 2012), <https://www.whitman.edu/newsroom/whitman-magazine/2012/july-2012/campaign-update/building-upon-a-legacy-of-law>.

147. *Neil Gorsuch*, OYEZ, https://www.oyez.org/justices/neil_gorsuch (last visited Apr. 16, 2019).

148. E-mail from Sara Logue, Assistant Univ. Archivist for Pub. Servs., Seeley G. Mudd Manuscript Library, Princeton Univ. (Mar. 19, 2019) (on file with author).

149. *Anthony Kennedy Biography*, BIOGRAPHY.COM (Apr. 2, 2014), <https://www.biography.com/law-figure/anthony-kennedy>.

150. *Sandra Day O'Connor*, OYEZ, https://www.oyez.org/justices/sandra_day_oconnor (last visited Apr. 16, 2019).

151. Gracie Hale, Ted Gilson & Ruth Bryan, *Stanley Forman Reed Papers*, U. KY., <https://exploreuk.uky.edu/fa/findingaid/?id=xt700000032b> (last visited Apr. 17, 2019).

152. *William H. Rehnquist*, OYEZ, https://www.oyez.org/justices/william_h_rehnquist (last visited Apr. 16, 2019).

153. *Biography of Earl Warren*, EARL WARREN C., <https://warren.ucsd.edu/about/biography.html> (last visited Apr. 16, 2019).

White (Economics).¹⁵⁴ Some of these Justices also received a bachelor’s in a humanities field, but this does not change the coding scheme.¹⁵⁵

2. *The Strategic Model of Judicial Decisionmaking*

The strategic model of judicial decisionmaking also typically assumes Justices are only interested in shaping legal policy, but they pursue this goal in light of institutional constraints, the preferences of other Justices, and the expectations of external actors.¹⁵⁶ For example, a Justice would need to weigh their policy preferences against the possibility of non-compliance with a sincerely-written opinion. Alternatively, perhaps a Justice would want to wait until public opinion was on their side before pushing the law in a certain direction.

Only within the last fifteen years or so did scholars begin to examine Supreme Court opinions as potential data sources. Studies have found Justices use framing devices in their opinions to support their point of view. Justices make strategic references to the *Federalist Papers*¹⁵⁷ and other rhetorical sources, such as Blackstone’s *Commentaries*, the Magna Carta, the Declaration of Independence, and the opinions of Chief Justice Marshall.¹⁵⁸ They even vary in their tendencies to cite precedent¹⁵⁹ and amicus curiae briefs,¹⁶⁰ depending on the context of a case. None of these studies, however, has examined the conditions under which Justices reference science in their opinions.

154. CU-Boulder Chancellor, *President, Law School Dean Laud Scholar-Athlete Byron White*, CU BOULDER TODAY (Apr. 14, 2002), <https://www.colorado.edu/today/2002/04/14/cu-boulder-chancellor-president-law-school-dean-laud-scholar-athlete-byron-white>.

155. For example, Justice Breyer received an A.B. in philosophy from Harvard in addition to his PPE degree from Oxford. Caplan, *supra* note 10.

156. LEE EPSTEIN & JACK KNIGHT, *THE CHOICES JUSTICES MAKE* 10 (1998) (“[J]ustices may be primarily seekers of legal policy, but they are not unconstrained actors who make decisions based only on their own ideological attitudes.”). More recent scholarship has acknowledged Justices have multiple goals, like job satisfaction. See LEE EPSTEIN, WILLIAM M. LANDES & RICHARD A. POSNER, *THE BEHAVIOR OF FEDERAL JUDGES: A THEORETICAL AND EMPIRICAL STUDY OF RATIONAL CHOICE* (2013). Describing their earlier account of the strategic model Epstein and Knight admitted, “We were wrong. . . . [Policy] is not the only motivation; it may not even be dominant for many judges.” Lee Epstein & Jack Knight, *Reconsidering Judicial Preferences*, 16 ANN. REV. POL. SCI. 11, 12 (2013).

157. Pamela C. Corley, Robert M. Howard & David C. Nixon, *The Supreme Court and Opinion Content: The Use of the Federalist Papers*, 58 POL. RES. Q. 329 (2005).

158. Robert J. Hume, *The Use of Rhetorical Sources by the U.S. Supreme Court*, 40 LAW & SOC’Y REV. 817, 822–24 (2006).

159. Yonatan Lupu & James H. Fowler, *Strategic Citations to Precedent on the U.S. Supreme Court*, 42 J. LEGAL STUD. 151 (2013).

160. Paul M. Collins Jr., *Amici Curiae and Dissensus on the U.S. Supreme Court*, 5 J. EMPIRICAL LEGAL STUD. 143 (2008).

Science offers a tool to persuade other Justices or make an opinion seem more legitimate in the eyes of external actors. In particular, science can disguise the ideological conclusion the author reaches because science provides non-ideological reasoning. Citing science also puts Justices on the opposing side of the case in the uncomfortable position of refuting the scientific evidence or denying its relevance. Thus, I predict that Justices will be more likely to cite science in opinions that are consistent with their ideology (Ideological Polarization Hypothesis).

The salience of a particular case also shapes how Justices write their opinions. References to the *Federalist Papers* and other rhetorical sources occur more frequently in cases in which the Court strikes down a law, overturns a precedent, or decides cases with a closely divided vote. Justices may feel the need to leverage as many arguments as they can in more important cases. This may explain why scholars have found Supreme Court opinions are significantly longer in salient cases, which they define as those reported on the front page of the *New York Times*.¹⁶¹

Three notable examples illustrate the connection between long opinions and making appeals to science. Justice Breyer referenced relevant scientific evidence in an appendix following his dissenting opinion in *United States v. Lopez* (citing 123 non-governmental studies and reports connecting school violence to economic productivity),¹⁶² *Brown v. Entertainment Merchants Ass'n* (citing 150 peer-reviewed studies outlining the psychological risks to children posed by violent video games),¹⁶³ and *McDonald v. City of Chicago*¹⁶⁴ (citing seven peer-reviewed studies on the public safety threats posed by gun ownership). In two of these cases, *Lopez*¹⁶⁵ and *McDonald*,¹⁶⁶ Justice Breyer read his dissent from the bench, which is a signal of a Justice's profound disagreement with the majority.¹⁶⁷ Prior scholarship has found that dissenting from the bench frequently occurs in salient cases.¹⁶⁸

Thus, the Case Salience Hypothesis predicts that Justices are significantly more likely to reference social science studies in more important cases.

161. Ryan C. Black & James F. Spriggs II, *An Empirical Analysis of the Length of U.S. Supreme Court Opinions*, 45 HOUS. L. REV. 621, 648, 657–58, 665, 674 (2008). For an analysis of why making the front page of the *New York Times* constitutes a valid measure of case salience, see Lee Epstein & Jeffrey A. Segal, *Measuring Issue Salience*, 44 AM. J. POL. SCI. 66, 72 (2000).

162. 514 U.S. 549, 631–44 (1995) (Breyer, J., dissenting).

163. 564 U.S. 786, 858–72 (2011) (Breyer, J., dissenting).

164. 561 U.S. 742, 941–44 (2010) (Breyer, J., dissenting).

165. *United States v. Lopez*, OYEZ, <https://www.oyez.org/cases/1994/93-1260> (last visited Apr. 23, 2019).

166. *McDonald v. Chicago*, OYEZ, <https://www.oyez.org/cases/2009/08-1521> (last visited Apr. 23, 2019).

167. William D. Blake & Hans J. Hacker, “*The Brooding Spirit of the Law*”: *Supreme Court Justices Reading Dissents from the Bench*, 31 JUST. SYS. J. 1, 2 (2010).

168. *Id.* at 9.

In my analysis, I operationalize salience using several criteria: cases involving judicial review, holding a law unconstitutional, overturning a precedent, being decided by a closely divided vote, receiving heavier media coverage,¹⁶⁹ or featuring a larger number of amicus briefs.¹⁷⁰

3. *The Legal Model of Judicial Decisionmaking*

The legal model of judicial behavior is usually portrayed as a straw man against which attitudinalists can claim the empirical high ground.¹⁷¹ For example, in the first chapter of *The Supreme Court and the Attitudinal Model Revisited*, political scientists Jeffrey Segal and Harold Spaeth use the word “naïve” four times to characterize the notion that Supreme Court Justices are not policymakers.¹⁷² Subsequent quantitative political science scholarship has taken the legal model more seriously, uncovering evidence that legal doctrine constrains judicial ideology.

Political scientists Michael Bailey and Forrest Maltzman find evidence that *stare decisis* constrains every member of the Court. This commitment is even higher among Justices with prior judicial experience. The Justices also defer to the elected branches, but many times it is not out of fear of retaliation, but a normative concern for a properly limited judicial role.¹⁷³ Another study finds appellate court judges act much less ideologically when citing binding precedent than nonbinding precedents set by different circuits.¹⁷⁴ In other words, appellate judges seek out arguments from other circuits that support their worldview when they can, but when they must follow binding precedent that goes against their worldview, they do so.

Other scholars have found Supreme Court cases that provide more legal certainty are more likely to be decided unanimously.¹⁷⁵ If scientific evidence, like that provided in the Brandeis Brief, can provide more information, and

169. See Richard L. Pacelle Jr. et al., *Assessing the Influence of Amicus Curiae Briefs on the Roberts Court*, 99 SOC. SCI. Q. 1253 (2018).

170. See Ryan Salzman, Christopher J. Williams & Bryan T. Calvin, *The Determinants of the Number of Amicus Briefs Filed Before the U.S. Supreme Court, 1953-2001*, 32 JUST. SYS. J. 293 (2011).

171. See Gerald N. Rosenberg, *Symposium: The Supreme Court and the Attitudinal Model*, 4 LAW & CTS. NEWSLETTER 6 (1994), <http://lawcourts.org/pubs/newsletter/spring94.pdf> (last visited Aug. 25, 2019); Rogers M. Smith, *Symposium: The Supreme Court and the Attitudinal Model*, 4 LAW & CTS. NEWSLETTER 8 (1994), <http://lawcourts.org/pubs/newsletter/spring94.pdf> (last visited Aug. 25, 2019).

172. SEGAL & SPAETH, *supra* note 127, at 7–8.

173. See MICHAEL A. BAILEY & FORREST MALTZMAN, *THE CONSTRAINED COURT: LAW, POLITICS, AND THE DECISIONS JUSTICES MAKE* 8–11 (2011).

174. Rachael K. Hinkle, *Legal Constraint in the US Courts of Appeals*, 77 J. POL. 721, 722 (2015).

175. See PAMELA C. CORLEY, AMY STEIGERWALT & ARTEMUS WARD, *THE PUZZLE OF UNANIMITY: CONSENSUS ON THE UNITED STATES SUPREME COURT* 12 (2013).

therefore clarity, science may moderate the influence of ideology on decisionmaking.¹⁷⁶ Justices are also more likely to write separately to explain a counter-attitudinal vote.¹⁷⁷ In other words, if a liberal Justice casts a conservative vote, she is more likely to write a concurring or dissenting opinion to indicate why. Citing science may be a useful tool in such opinions. The Ideological Moderation Hypothesis thus predicts the opposite of the Ideological Polarization Hypothesis—Justices will be less likely to make appeals to science when they write opinions consistent with their ideology.

B. Data and Summary Statistics

To test these hypotheses, I created an original dataset of Supreme Court citations to social science from 1954 to 2018. I generated the data using a series of targeted searches of the Westlaw database, which I then merged with the Supreme Court Database.¹⁷⁸ The data attempts to capture as many journal articles and books as possible within the following academic disciplines: anthropology, economics, education, geography, linguistics, psychiatry, psychology, political science, public health, social work, and sociology. I recognize many academic disciplines in the natural sciences produce research that is relevant to Supreme Court cases, and that analysis will be conducted in a future version of this project.

The Bluebook, while infuriating,¹⁷⁹ creates a predictable method of searching for books and journal articles cited in judicial opinions. According to *The Bluebook* rules, the title of the book or journal occurs shortly before the year of publication. To assist in my searches for publication titles and years of publication, I used wildcard searches on Westlaw, which capture variations of words with a common stem. For example, searching “19!” will return all numbers starting with “19”, capturing hits from 1900 to 1999. This term will locate scientific studies published in the twentieth century.

My search protocols also assume many journal and book titles within a discipline include the name of that discipline. Wildcard searches help here, too. Searching Westlaw for “pol!” will capture the words “politics,” “political,” and “policy,” all of which help identify book and journal titles within political science. As a robustness check, I cross-referenced the search terms against a database of every journal in each discipline. On average, the search terms successfully identified 59% of journals per scientific field. The results of this analysis and other information about data collection are available in the Appendix.

176. See *supra* Section I.A.

177. See Paul M. Collins, *Cognitive Dissonance on the U.S. Supreme Court*, 64 POL. RES. Q. 362, 371 (2011).

178. *Modern Database*, SUPREME COURT DATABASE <http://scdb.wustl.edu/data.php> (last visited Apr. 29, 2019).

179. See Richard A. Posner, *The Bluebook Blues*, 120 YALE L.J. 850, 858 (2011).

Table 1 provides an overview of how frequently Supreme Court opinions cite at least one study from each discipline in the sample. As displayed in Table 1, political science is the most commonly cited social science discipline, while there are no references to social work or linguistics studies. The latter non-finding is particularly intriguing because originalism developed in part as a reaction to trends in linguistic scholarship.¹⁸⁰

TABLE 1. SUPREME COURT OPINIONS CITING SCIENTIFIC STUDIES, BY DISCIPLINE

Discipline	Opinions
Anthropology	2
Economics	35
Education	8
Geography	4
Linguistics	0
Political Science	83
Psychiatry	28
Psychology	40
Public Health	13
Social Work	0
Sociology	19

The overall number of opinions citing science is very low when one considers the Justices wrote 16,420 opinions during this time frame. By contrast, the *Harvard Law Review* and *Yale Law Journal* have each been cited in more than one thousand Supreme Court cases since the dawn of the Warren Court.¹⁸¹

Table 2 summarizes which Justices are more likely to reference science. Justice Brennan cited at least one social science study in twenty of his opinions, more than any other Justice in the sample. In terms of percentage of opinions that make appeals to science, however, Justice Stephen Breyer leads

180. Jesse Pearson, *Bryan Garner*, VICE (Nov. 30, 2010, 7:00 PM), https://www.vice.com/en_us/article/5g53bd/bryan-garner-641-v17n12 (quoting Garner, who co-authored two books about originalism with Justice Antonin Scalia, saying, “And there is a view among some inane linguists that says that we shouldn’t be teaching nonstandard speakers the standard dialect—that it’s simply the dialect of the people in power. Instead, we should be teaching everyone to be accepting of linguistic differences.”).

181. Specifically, the *Harvard Law Review* has been cited at least once in 1,006 Supreme Court cases, while the *Yale Law Journal* has at least one citation in 1,019 cases. These figures would be significantly higher if I went through and tallied citations in individual opinions, like I counted references to social science studies.

the pack. As mentioned earlier, both Justice Brennan and Justice Breyer received undergraduate degrees in social science fields.¹⁸²

Seven Justices did not cite social science in any of their opinions. Aside from Justice Black, these Justices served on the Court for only a few terms covered in the sample. Another interesting finding in Table 2 is that Chief Justices appear much less likely to rely on scientific evidence compared to associate Justices. Only Chief Justice Burger cited science in at least one percent of his opinions. As mentioned earlier, Chief Justice Warren appealed to science only once—in Footnote 11 of *Brown v. Board of Education*.¹⁸³

TABLE 2. SUPREME COURT OPINIONS CITING SCIENTIFIC STUDIES, BY JUSTICE

Justice	Opinions	Percentage
Breyer	16	3.0
Sotomayor	5	2.8
Kennedy	16	2.6
Alito	5	1.8
Blackmun	15	1.7
Brennan	20	1.6
Ginsburg	7	1.6
Souter	6	1.6
White	17	1.5
Burger	6	1.2
Stewart	10	1.2
Thomas	8	1.2
Douglas	10	1.0
Stevens	16	1.0
Goldberg	1	0.9
Marshall	9	0.9
Scalia	8	0.9
Kagan	1	0.8
Fortas	1	0.7
Rehnquist	7	0.7
Frankfurter	2	0.6

182. See *supra* notes 144–145 and accompanying text.

183. See *supra* Section I.B.

Harlan	5	0.6
Powell	5	0.6
Roberts	1	0.6
Clark	2	0.5
O’Connor	3	0.5
Warren	1	0.3
Black	0	0.0
Burton	0	0.0
Gorsuch	0	0.0
Jackson	0	0.0
Minton	0	0.0
Reed	0	0.0
Whitaker	0	0.0

Table 3 reviews the legal issues considered in cases that cite science and compares them to the Supreme Court’s overall docket. On some issues, for example cases involving unions or criminal procedure, appeals to science occur at a lower rate than one would expect given how frequently they come before the Court. On many other issues, including civil rights, the First Amendment, due process, and privacy, Justices make scientific references at a higher rate than they appear on the docket.

TABLE 3. LEGAL ISSUE IN CASES WITH OPINIONS CITING SCIENTIFIC STUDIES

<u>Issue Area</u>	<u>Cases</u>	<u>Sample %</u>	<u>Docket %</u>
Criminal Procedure	29	16.3	25.5
Civil Rights	48	27.6	17.3
First Amendment	29	17.7	10.9
Due Process	12	5.9	4.1
Privacy	22	4.9	1.9
Attorneys	2	0.5	1.3
Unions	1	2.0	3.8
Economic Activity	30	13.8	18.0
Judicial Power	13	6.9	9.8
Federalism	12	3.5	4.1
Miscellaneous	2	1.0	0.1

While the descriptive statistics above reveal interesting patterns in the data, they do not tell the whole story. The next Section tests each hypothesis developed in Section II.A. Multivariate analyses highlight which Justice-level, opinion-level, and case-level factors play a significant role in the relationship between science and Supreme Court opinion-writing.

III. ANALYZING THE INFLUENCE OF SCIENCE ON SUPREME COURT BEHAVIOR

This Section presents two multivariate regression analyses. The first, presented in Table 4, tests the conditions under which an opinion is more likely to cite at least one scientific study and tests the Science Major Hypothesis, the Judicial Liberalism Hypothesis, and the Case Salience Hypothesis. The second multivariate analysis, displayed in Table 5, examines the interplay between the use of science, judicial ideology, and the ideological direction of judicial opinions. These regressions provide tests for the Ideological Moderation and Ideological Polarization Hypotheses.

A. *Methods and Variables*

The dependent variable in the first regression analysis is whether a given Supreme Court opinion cites at least one scientific study. The dichotomous nature of the dependent variable makes logistic regression an appropriate method. However, logistic regression assumes positive and negative outcomes are equally likely to occur. Very few Supreme Court opinions cite scientific studies, so traditional logistic regression may create biased results. Therefore, instead, the analysis employs the Firth logistic regression program in Stata, which uses penalized maximum likelihood coefficients to estimate rare events.¹⁸⁴

The dependent variable in the second regression is also dichotomous: whether a Supreme Court opinion supports the liberal position in a given case. Because a Justice's ideology is strongly correlated with the ideological directions of their opinions, ordinary logistic regression could create biased coefficients.¹⁸⁵ Consequently, instead, each model in Table 5 uses multilevel logistic regression with a random intercept for each Justice.

The analyses employ judicial common space scores as measures of Judicial Ideology, with higher values indicating more conservative Justices.¹⁸⁶ The Science Major variable is a dichotomous measure of whether a Justice

184. See Rainer Puhr et al., *Firth's Logistic Regression with Rare Events: Accurate Effect Estimates and Predictions?*, 36 STAT. IN MED. 2302, 2302 (2017).

185. See ANDREW GELMAN & JENNIFER HILL, DATA ANALYSIS USING REGRESSION AND MULTILEVEL/HIERARCHICAL MODELS (2007).

186. See Epstein et al., *supra* note 11, at 318–20.

has at least one bachelor’s degree in math, any natural science, or social science. Judicial Review Case is a dichotomous variable that takes the value of one if at least one of the authorities for the Court’s decision involved federal or state judicial review. The Declared Unconstitutional variable measures whether the Court struck down a federal or state law, either in part or in its entirety.

The Divided Court variable measures the inverse of the size of the majority coalition in a given case. In other words, a case decided 9-0 takes the value of negative nine, whereas a case decided 5-4 is recorded as negative one. I used the Supreme Court Database to build variables that differentiate between Majority, Concurring, and Dissenting Opinions. The database also contains a variable that reflects whether the majority opinion in the case in question formally altered precedent. I merged data from other scholars to measure the total number of amicus curiae briefs submitted for each case¹⁸⁷ and a Case Salience Index based on the breadth of media coverage generated by each case.¹⁸⁸ I also utilized the Supreme Court Database to construct a dichotomous Administrative Agency Case variable, which measures whether the case originated at an administrative hearing or proceeding. These cases may be more technical in nature and require scientific evidence to decide them.¹⁸⁹

B. Regression Analysis of Citing Science in an Opinion

Table 4 presents the results of two Firth logistic regression models predicting the circumstances under which a Supreme Court opinion is likely to cite at least one scientific study. In Model 1, judicial ideology exerts a statistically significant effect in the predicted direction, confirming the Judicial

187. Paul M. Collins, Jr., *Data*, U. MASS. AMHERST: PAUL M. COLLINS, JR., <https://blogs.umass.edu/pmcollins/data/> (last visited Apr. 29, 2019); e-mail from John M. Scheb, Professor of Political Sci., Univ. Tenn. (Mar. 18, 2019) (on file with author). Dr. Scheb is one of the co-authors of the study. Pacelle et al., *supra* note 169.

188. Todd Collins & Christopher A. Cooper, *Case Salience Index 1953-2014 Terms*, HARVARD DATAVERSE (2016), <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/UR2KYE> (last visited Apr. 29, 2019). The additive index ranges from zero to eight based on the case’s presence in the *New York Times*, *Chicago Tribune*, *Los Angeles Times*, and *Washington Post*. If one of those newspapers covers the case, it is recorded as one, but if it receives front-page coverage it is coded as two.

189. For example, Verizon questioned whether the FCC had the power to require state utility commissions to set rates on a forward-looking basis. *Verizon Commc’ns v. FCC*, 535 U.S. 467, 475 (2002). Before the case could reach the Supreme Court in 2002, the dispute began with a 1994 FCC order. Admin. N. Am. Numbering Plan, 9 FCC Rcd. 2068, (Apr. 4, 1994). The F.C.C. calculated rates based on a defined “cost,” abandoning the old fair-value approach. *See, e.g., Verizon Commc’ns*, 535 U.S. at 484 (citing ALFRED KAHN, *THE ECONOMICS OF REGULATION: PRINCIPLES AND INSTITUTIONS* 40–41 (1988)).

Liberalism Hypothesis.¹⁹⁰ Figure 1 visualizes this finding—liberal Justices are more likely to cite scientific studies than conservative Justices.

TABLE 4. PENALIZED MAXIMUM LIKELIHOOD LOGISTIC REGRESSION
MODEL OF OPINIONS CITING SCIENCE

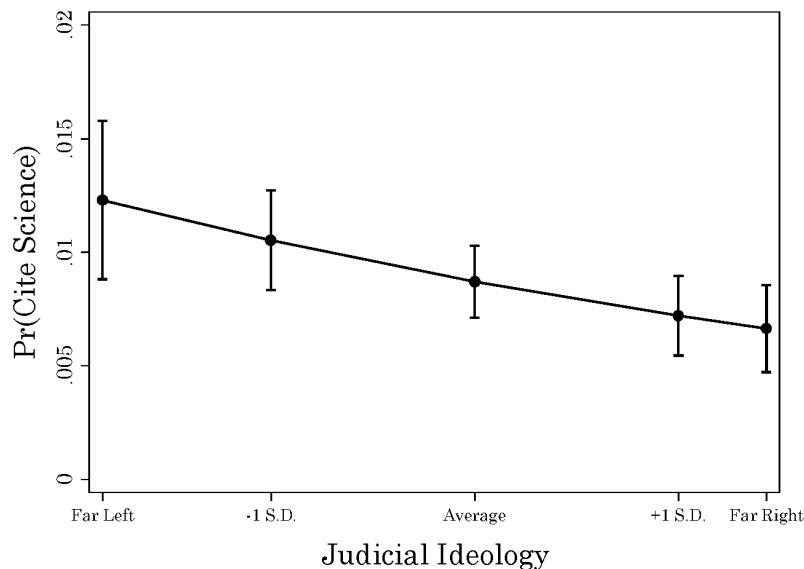
Predictor	Model 1	Model 2
Judicial Ideology	-0.377*** (0.139)	-0.470*** (0.149)
Science Major	0.306** (0.145)	0.305** (0.154)
Judicial Review Case	0.929*** (0.171)	0.662*** (0.183)
Declared Unconstitutional	0.752*** (0.175)	0.392** (0.192)
Altered Precedent	0.732*** (0.258)	0.191 (0.310)
Divided Court	0.096*** (0.028)	0.041 (0.029)
Administrative Agency Case	0.056 (0.168)	0.035 (0.176)
Concurring Opinion	-0.937*** (0.217)	-1.049*** (0.226)
Dissenting Opinion	-0.445*** (0.161)	-0.534*** (0.175)
Term	0.021*** (0.004)	0.017*** (0.005)
Case Salience Index		0.218*** (0.036)
Amicus Curiae Briefs		0.014*** (0.005)
Constant	-46.618*** (8.901)	-38.780*** (10.326)
Observations	16,411	14,535
χ^2	165.9***	180.7***

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

190. The consensus in political science is that a p -value of less than 0.10 is required to describe a finding as statistically significant, although p -values of less than 0.05 provide stronger evidence that the result is not due to chance.

The results indicate a one standard deviation change from the mean ideology in the liberal direction increases the predicted probability of invoking science by 17.2%. Model 1 also supports the Science Major Hypothesis. Justices who studied a scientific discipline as an undergraduate are 35.4% more likely than others to cite social science.

FIGURE 1. THE EFFECT OF JUDICIAL IDEOLOGY ON THE PROBABILITY OF CITING SOCIAL SCIENCE



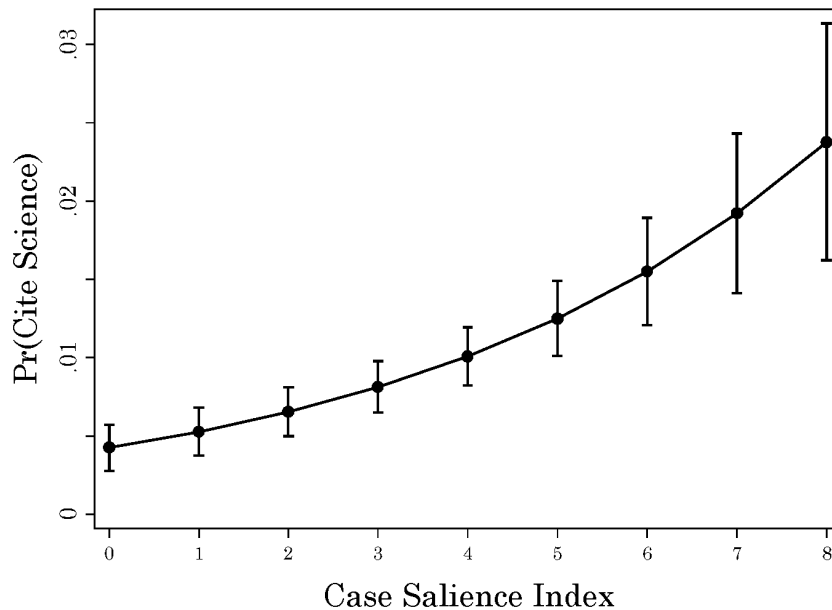
The evidence for the Case Salience Hypothesis is also quite strong. Scientific studies are 3.5 times more likely to be referenced in cases involving judicial review than other case types. If the Court strikes down the law in question, the probability a Justice will reference social science increases by an additional factor of 2.1. If the Court alters a previous precedent, regardless of whether the case involves constitutional or statutory interpretation, the likelihood of an opinion making a scientific appeal doubles. Justices are more likely to cite science in cases when the Court is more sharply divided. As the size of the majority coalition shrinks by one standard deviation from the mean (from roughly a four-vote majority coalition to a roughly two-vote majority coalition), the likelihood of finding a scientific citation increases by 31.6%.

Model 2 of Table 4 adds two additional variables to those analyzed in Model 1: the number of amicus curiae briefs submitted and the Case Salience Index, which measures a case’s level of media exposure. The number of

observations is smaller than Model 1 because the authors who calculated the amicus brief data and Case Salience Index could not find data for every case. The results across the models remain similar, although the Alteration of Precedent and Divided Court variables are no longer statistically significant. However, the two new variables in Model 2 are statistically significant, providing additional support for the Case Salience Hypothesis.

A one standard deviation change in the Case Salience Index increases the probability of a Justice citing science by 63.9%. Figure 2 displays this relationship. A similar finding occurs when more amici participate in a case. When the total number of amicus briefs increases by one standard deviation (7.4) from its mean (3.9), a Justice becomes 10.6% more likely to make a scientific appeal. While it is beyond the scope of this current study, it is likely that amicus briefs, like the one the NAACP submitted in *Brown*, provide the Court with relevant social science research they can choose to cite.

FIGURE 2. THE EFFECT OF CASE SALIENCE ON THE PROBABILITY OF CITING SOCIAL SCIENCE



The control variables also yield interesting findings, based on the results of Model 1. The likelihood of an opinion citing science increases by an average of 2.1% each term.¹⁹¹ Cases originating with administrative agency proceedings, however, are no more or less likely to produce opinions citing science. Authors of concurring opinions are 60.4% less likely to make scientific appeals, compared to majority opinions.¹⁹² Dissenting opinions are also 35.6% less likely to cite science. Citing science in a majority opinion may have more utility than in a concurrence or a dissent. As Robert Hume theorized, referencing unifying historical rhetoric “can hold together a majority coalition or encourage a wavering Justice to sign on.”¹⁹³ This same dynamic may be at play when it comes to citing scientific studies.

C. Regression Analysis of the Ideological Effect of Citing Science in Supreme Court Opinions

The analysis displayed in Table 5 measures the effect of Judicial Ideology and the decision to cite science on the ideological direction of an opinion. These models contain interaction terms between the two independent variables to analyze the degree to which citing science and judicial policy preferences jointly co-vary.¹⁹⁴ This modeling strategy provides a test for the Ideological Polarization and Ideological Moderation Hypotheses. Evidence that a liberal Justice is less likely to write a liberal opinion (or a conservative Justice, a conservative opinion) that cites science would support the Ideological Moderation Hypothesis.

Instead, the results are the opposite and provide evidence for the Ideological Polarization Hypothesis. The probability of a Justice on the Court’s far left writing a liberal opinion is 0.117 higher when they invoke science. Similarly, citing science increases the probability that a Justice on the Court’s far-right will write a conservative opinion by 0.113. Figure 3 displays the results of Model 1.¹⁹⁵

191. The coefficients in logistic regression models do not directly indicate what impact a one-unit change of an independent variable will have on the probability of the dependent variable being one. Instead, all reported effect sizes are based on the calculations of predicted probabilities, holding all other covariates at their means.

192. Majority opinions are omitted from Table 4 because they serve as the reference category against which the analysis measures the effect of writing a Concurring or Dissenting Opinion.

193. Hume, *supra* note 158, at 818.

194. One cannot conclude from the results displayed in Table 5 that a statistically significant interaction term provides evidence for the Ideological Polarization or Ideological Moderation Hypotheses. Instead, statistical significance must be calculated across a range of relevant values (in this case different levels of Judicial Liberalism). See Thomas Brambor, William Roberts Clark & Matt Golder, *Understanding Interaction Models: Improving Empirical Analyses*, 14 POL. ANALYSIS 63, 64 (2006). Table A2 of the Appendix reports these individual calculations of statistical significance.

195. These polarizing differences at every data point, save for the Court’s mean ideology, are statistically significant. See the Appendix for more details.

TABLE 5. MULTILEVEL LOGISTIC REGRESSION MODEL OF OPINION DIRECTION WITH JUSTICE-LEVEL RANDOM INTERCEPTS

Predictor	Model 1	Model 2
Judicial Ideology	-1.431*** (0.073)	-2.476*** (0.185)
Cites Study	0.066 (0.167)	0.197 (0.427)
Cites Study*Ideology	-0.895** (0.380)	-2.645** (1.271)
Constant	0.193*** (0.042)	-0.028 (0.148)
Random Intercept	0.040*** (0.015)	0.613*** (0.186)
Observations	16,168	5,958
Number of groups	34	34
χ^2	3.5***	185.4***
LR χ^2	63.4***	272.4***

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Model 2 examines only dissenting opinions, and the results provide even stronger evidence of polarization. The probability that a Justice who is one standard deviation more liberal than the Court's average will write a liberal opinion increases by 0.150 when they cite science. If a Justice one-standard deviation more conservative than the mean cites science, the probability they will write a conservative opinion increases by 0.148. Figure 4 displays these results.¹⁹⁶

These findings are even more impressive in light of the "floor and ceiling effects" in these models. Each of the four figures in the Article have a y-axis that measures a predicted probability that ranges from zero to one, the equivalent range of zero to one hundred percent. Overall, a Justice at the Court's far left wing will write a liberal dissent about eighty-seven percent of the time. A Justice on the far right, by contrast, will write a liberal dissent fourteen percent of the time. Considering how close these values are to the top and bottom of the y-axis scale (the ceiling and floor), there is not much room for a Justice at either extreme to become more ideological in her decisionmaking. And yet, when a Justice on the far left or right cites science in

196. At every point displayed in Figure 4, except for the Court's mean ideology, citing science exerts a statistically significant, polarizing effect. See the Appendix for more information on the size of these effects.

a dissent, they are even more likely to do so in an ideologically-congruous opinion.

FIGURE 3. THE EFFECT OF CITING SCIENTIFIC STUDIES IN ALL OPINIONS

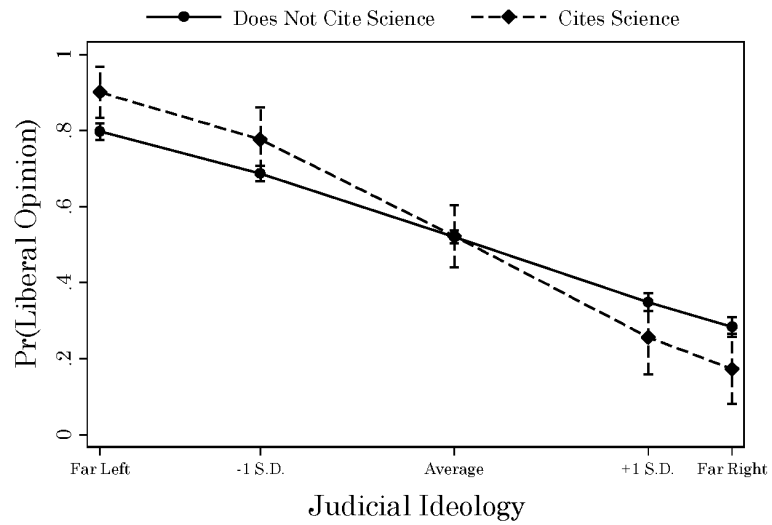
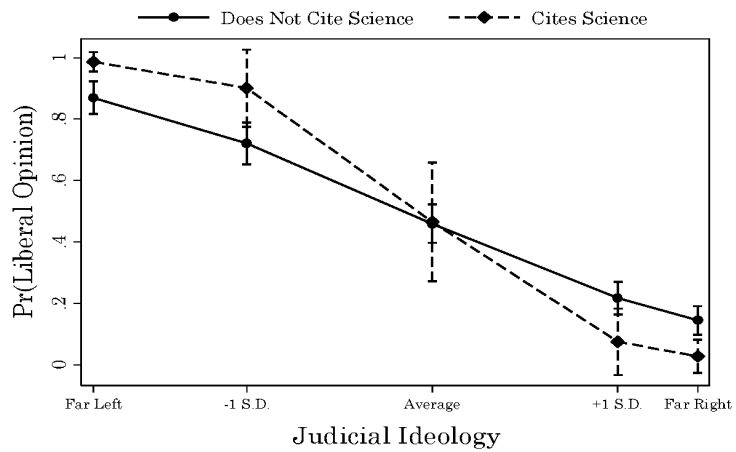


FIGURE 4. THE EFFECT OF CITING SCIENTIFIC STUDIES IN DISSENTING OPINIONS



The polarizing effect of citing science in a dissenting opinion may reflect a Justice's desire to persuade the public, other external actors, or a future Supreme Court that the majority opinion was not just wrong as a matter of law but also a distortion of objective reality. Dissenting opinions, according to Chief Justice Charles Evans Hughes, represent "an appeal to the brooding spirit of the law, to the intelligence of a future day, when a later decision may possibly correct the error into which the dissenting judge believes the court to have been betrayed."¹⁹⁷ Science can provide additional evidence that the Court had erred.

IV. CONCLUSION

The findings discussed in this Article, while preliminary, suggest the Court faces significant obstacles in how it uses science. Justices very rarely make appeals to science, although those who majored in a scientific discipline are more likely to do so. Across several different measures of case salience, the results consistently demonstrate that scientific appeals occur more frequently in more prominent cases. When the Justices do invoke science, other normatively troubling patterns emerge. Liberal Justices are more likely to cite science than conservative Justices. The decision to cite science is one that polarizes Justices on the Court's left and right. Rather than letting scientific knowledge mitigate a Justice's ideological proclivities, the data indicate Justices on both ends of the spectrum resort to scientific arguments to bolster their underlying worldviews.

Future research is needed to see if these findings generalize to references to other academic disciplines, especially in the natural sciences. While this study attempts to document the output of scientific information in judicial opinions, it does not provide insight into how the Justices find scientific information. Do the Justices conduct literature reviews on their own or with their clerks? Alternatively, do Justices only cite science when a brief provides a potential reference? I hope to address this in future research, along with refining the search protocols and identifying a way to measure whether a Justice cites science positively or negatively.

Further research is also needed because of the high stakes involved in the use, non-use, or misuse of science in judicial opinions. Sometimes, the Court creates legal controversy when it relies on poorly-designed scientific research, as the debate about Footnote 11 in *Brown* exemplifies.¹⁹⁸ Judges, such as the one tasked with desegregating the Washington, D.C. public schools, may throw up their hands in frustration when encountering scientific

197. CHARLES EVANS HUGHES, *THE SUPREME COURT OF THE UNITED STATES* 68 (1936).

198. *See supra* notes 94–98 and accompanying text.

research they do not understand.¹⁹⁹ Even ostensibly pro-science Justices might misstate scientific conclusions, as Justice Brennan did in *Craig v. Boren*.²⁰⁰

Sometimes, the consequences of judicial reliance on substandard research are insidious and long-lasting. The racist pseudo-science comparing the brains of white and black Americans provided a veneer of objectivity to segregationist legal precedents that lasted more than a half century.²⁰¹ Junk science also muddled Eighth Amendment debates over execution methods. Most states eventually abandoned the electric chair, but nine states still allow death by electrocution as a “backup” method to lethal injection.²⁰² The United States Supreme Court’s holding in *Kemmler* still stands, and only two state supreme courts (Georgia²⁰³ and Nebraska²⁰⁴) have leveraged modern scientific research to strike down electrocution as being unconstitutionally cruel. Thus, more than a century later, junk science undergirds Eighth Amendment doctrine in most of the United States.

We might excuse ordinary citizens who engage in partisan-motivated reasoning when it comes to their attitudes towards science, but perhaps citizens should expect more from their judges, especially when correctly interpreting top-flight social scientific research can inform the Court on any number of legal issues. Even if a Justice feels overwhelmed, scientific associations frequently submit amicus briefs, which break down complex scientific concepts into more digestible language.²⁰⁵ If a Justice remains befud-

199. See *supra* notes 87–91 and accompanying text.

200. See *supra* notes 105–115 and accompanying text.

201. See *supra* notes 57–62 and accompanying text.

202. These states are Alabama, Arkansas, Florida, Kentucky, Mississippi, Oklahoma, South Carolina, Tennessee, and Virginia. *Methods of Execution*, DEATH PENALTY INFORMATION CENTER, <https://deathpenaltyinfo.org/executions/methods-of-execution> (last visited Aug. 23, 2019).

203. *Dawson v. State*, 554 S.E.2d 137, 144 (Ga. 2001) (“The Legislature’s adoption of lethal injection as the exclusive method for executing the death penalty in Georgia reflects societal consensus that the ‘science of the present day’ has provided a less painful, less barbarous means for taking the life of condemned prisoners.”).

204. *State v. Mata*, 745 N.W.2d 229, 266 (Neb. 2008) (“Scientific knowledge about electricity and its effects on the human body has vastly expanded since 1913, when the Nebraska Legislature first selected electrocution over hanging.”).

205. See AMERICAN PSYCHOLOGICAL ASSOCIATION, DIVISION OFFICERS HANDBOOK App. IV (Rev. ed. 2003), <https://www.apa.org/about/division/officers/handbook/index?item=17> (“If participation as amicus curiae is approved, the Office of General Counsel will undertake preparation of the brief. . . . Appropriate experts in the field will be consulted in the course of drafting the brief. . . .”). Once again, the American Political Science Association is an unfortunate exception. Although individual political scientists have sometimes written amicus briefs, the Association itself has only joined one brief in the last fifteen years. American Political Science Association, *APSA Public Statements and Letters*, <https://www.apsanet.org/ABOUT/APSA-Public-Statements-and-Letters> (last visited May 4, 2019).

dled, they may consult a Supreme Court Fellow, hired for their scientific research skills.²⁰⁶ In short, even if a case seems full of “gobbledygook,” a conscientious Supreme Court Justice has tools available to make sense of social science.

206. See *Fellowship Placements*, SUPREME COURT OF THE UNITED STATES, <https://www.supremecourt.gov/fellows/fellowships.aspx> (last visited Apr. 6, 2019) (“The Federal Judicial Center is the education and research agency for the federal judiciary. It provides orientation and continuing education for all federal judges . . . on specific subjects, such as patent law, *scientific evidence*, or arbitration, and *empirically based studies in judicial reform*. . . . The Fellow serving at the Federal Judicial Center supports the Center’s research and educational activities” (emphases added)).

APPENDIX

To contextualize the data presented in Table 1, I do not attempt to count how many studies within a given discipline one opinion cites. However, if the same opinion cites studies from multiple disciplines, I count the opinion in both scientific fields. I consulted the websites of many interdisciplinary journals to attempt to identify if there was a dominant discipline. The sample does not include any law reviews, including interdisciplinary law reviews.

The following is an example of my search protocols. The term OP(Politic! +5 19!) searches each opinion (thus excluding the case’s headnotes) for any word beginning with the letters “Politic” (like Politics or Political) followed (within five words) by any number beginning with 19 (like 1995). This term should capture studies published in most political science journals in the twentieth century, and tweaking the search term to OP(Pol! +5 20!) should uncover twenty-first-century studies.

To test the thoroughness of my search terms, I downloaded a list of every journal within each social science discipline listed in the Journal Citation Reports database.²⁰⁷ Table A1 reports the percentage of journals within each academic field that would be captured by the corresponding Westlaw search term.

TABLE A1. ACCURACY OF WESTLAW SEARCH TERMS

Discipline	% Journals Included
Anthropology	36
Economics	75
Education	67
Geography	58
Linguistics	41
Political Science	53
Psychiatry	61
Psychology	68
Public Health	49
Social Work	71
Sociology	70

207. *Journal Citation Reports*, CLARIVATE ANALYTICS, <https://clarivate.com/webofsciencelibrary/solutions/journal-citation-reports/> (last visited Apr. 8, 2019).

Table A2 contextualizes the effect size and statistical significance of the interaction term between judicial ideology and citing science analyzed in Table 5.

TABLE A2. MARGINAL EFFECT OF CITING SCIENTIFIC STUDIES ON WRITING A LIBERAL OPINION, BY IDEOLOGY (USING THE TABLE 5 MODELS)

Ideology	Model 1		Model 2	
	M.E.	<i>p</i>	M.E.	<i>P</i>
Far Left	0.117	0.000	0.110	0.000
-1 S.D.	0.104	0.013	0.150	0.026
Average	-0.011	0.792	-0.031	0.440
+1 S.D.	-0.130	0.005	-0.148	0.000
Far Right	-0.145	0.000	-0.116	0.000
Liberal (Avg.)	0.105	0.012	0.152	0.015
Conservative (Avg.)	-0.113	0.015	-0.145	0.023