

**POLITICAL MACHINES: THE ROLE OF SOFTWARE IN ENABLING
AND DETECTING PARTISAN GERRYMANDERING UNDER THE
WHITFORD STANDARD**

*Graeme Earle**

Partisan gerrymandering, the practice of shaping district lines to the advantage of one political party, has haunted American politics for centuries. Innovations in districting software have sharpened the effects of partisan gerrymanders by increasing their advantages while concealing their creation. In response, courts are reevaluating the judicial manageability of partisan gerrymandering. Any standard arising from this reevaluation will inevitably require plaintiffs to prove that the drafters of district plans intended to gerrymander. Due to the complexity of measuring partisan advantage, this proof will need to come in the form of witness testimony or close observation of the districting process. By using automated districting software, legislators could gerrymander without leaving behind any of this critical evidence, thereby enabling partisan gerrymandering. New laws, policy, and improvements to algorithmic generations of alternative district plans promise to preserve the democratic process by preventing gerrymanders altogether or detecting gerrymanders based on their effects.

I. INTRODUCTION	68
II. THE EFFECTS OF AUTOMATED DISTRICTING SOFTWARE ON PARTISAN GERRYMANDERING.....	72
A. <i>How Automated Districting Software Hides the Intent to Gerrymander</i>.....	74

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- B. *How Automated Districting Software Hides the Effects of a Gerrymander*..... 79

III. SOLUTIONS TO THE EFFECTS OF AUTOMATED DISTRICTING SOFTWARE..... **85**

A. *Allowing Neutral Third Parties to Redistrict*..... 85

B. *Imposing Transparency on the Redistricting Process*.... 87

C. *Measuring the Effects of Partisan Gerrymanders to Identify Gross Disparity* 89

IV. CONCLUSION..... **97**

I. INTRODUCTION

Partisan gerrymandering is the practice of drawing voting districts to favor one political party over the other.¹ The shape of voting districts can disadvantage a political party by diluting the power of that parties’ votes until they win fewer seats relative to the number of votes they secure.² Partisan gerrymanders reduce the power of voters by “packing” them into districts that win by excessive margins³ and by “cracking” voters across multiple districts that each lose by slim margins.⁴ Together, these methods can allow political parties to entrench themselves in office by consistently holding a legislative majority even when they fail to win a majority of votes, effectively stripping away the public’s voting power.⁵

¹ See *Davis v. Bandemer*, 478 U.S. 109, 109 (1986) (explaining that a “reapportionment plan constituted a political gerrymander” when it intended to disadvantage a political party by arranging district lines to dilute votes cast for that party).

² See Nicholas O. Stephanopoulos & Eric M. McGhee, *Partisan Gerrymandering and the Efficiency Gap*, 82 U. Chi. L. Rev. 831, 834 (2015) (explaining how a gerrymandered district plan can secure more seats for a political party even when that party wins fewer votes).

³ *Id.* A district is “packed” when a large majority of voters support one political party in excess of the number required to win that district’s election. *Id.*

⁴ *Id.* A district is “cracked” when the majority party consistently wins by a slim margin, causing minority votes to count for nothing. *Id.*

⁵ *Whitford v. Gill*, 218 F. Supp. 3d 837, 886 (W.D. Wis. 2016) (“The danger with *extreme* partisan gerrymanders is that they entrench a political party in

Once or twice a decade, the Supreme Court considers the issue of partisan gerrymandering.⁶ Nevertheless, the Court has generally refrained from striking down district plans as unconstitutional partisan gerrymanders.⁷ Courts have hesitated to interfere with partisan gerrymandering in large part due to the practice's long history⁸ and the legislature's constitutional mandate to redraw district lines.⁹ The most compelling reason for the Court's refusal to interfere with partisan gerrymandering has been the lack of a judicially manageable standard.¹⁰ Unlike racial gerrymandering, partisan gerrymandering involves mutable characteristics whose measurement would "cast[] [judges] forth upon a sea of imponderables"¹¹ as they try to determine exactly how much partisan advantage a district plan must confer before courts have the power to intervene.

power, making that party—and therefore the state government—impervious to the interests of citizens affiliated with other political parties.”)

⁶ See *Vieth v. Jubelirer*, 541 U.S. 267, 361 (2004) (Breyer, J., dissenting) (“Where unjustified entrenchment takes place, voters find it far more difficult to remove those responsible for a government they do not want; and . . . democratic values are dishonored.”); see also *Davis*, 478 U.S. at 124 (“[E]ach political group in a State should have the same chance to elect representatives of its choice as any other political group.”); *Gaffney v. Cummings*, 412 U.S. 735, 754 (1973) (holding that district plans which disproportionately affect the voting strength of political groups “may be vulnerable” to challenges under the Equal Protection clause); *Fortson v. Dorsey*, 379 U.S. 433, 439 (1965) (holding that district plans may be challenged as unconstitutional when they “minimize or cancel out the voting strength of racial or political elements of the voting population”).

⁷ See *Davis*, 478 U.S. at 143 (holding that evidence of a partisan gerrymander failed to “surmount the threshold requirement” of showing how much partisan advantage would constitute too much); see also *Vieth*, 541 U.S. at 306 (“Eighteen years of essentially pointless litigation have persuaded us that *Bandemer* is incapable of principled application. We would therefore overrule that case, and decline to adjudicate these political gerrymandering claims.”).

⁸ See *Vieth*, 541 U.S. at 274 (“Political gerrymanders are not new to the American scene.”).

⁹ U.S. CONST. ART. I, § 4 (conferring to legislatures the power to determine “the Times, Places and Manner of holding Elections”).

¹⁰ See *League of Latin American Citizens v. Perry*, 548 U.S. 399, 420 (2006) (holding that the plaintiffs presented no “workable test for judging partisan gerrymanders”); see also *Vieth*, 541 U.S. at 281 (“[W]e must conclude that political gerrymandering claims are nonjusticiable . . .”).

¹¹ See *Vieth*, 541 U.S. at 290.

Free from fear of court intervention, legislatures have crafted powerful and blatant gerrymanders. For example, when citizens brought suit against North Carolina’s 2016 Congressional District Plan, one of the members of the legislative committee in charge of drafting that plan admitted to the court that he “propose[d] that [the Committee] draw the maps to give a partisan advantage to 10 Republicans and 3 Democrats because [he] d[id] not believe it [would be] possible to draw a map with 11 Republicans and 2 Democrats.”¹² The Supreme Court later struck down the plan as a racial gerrymander.¹³ However, had the plan not gerrymandered along racial lines, the North Carolina GOP would have avoided court intervention despite the fact that the committee member “‘acknowledge[d] freely that this would be a political gerrymander,’ which [the drafting Committee member] maintained ‘is not against the law.’”¹⁴

In 2012, the Wisconsin district court faced a similarly blatant gerrymander when the Wisconsin Republican Party won 60 out of 99 seats in the Wisconsin Assembly despite only winning 48.6% of the vote.¹⁵ When members of the public sued, the Wisconsin district court found itself thrust into Scalia’s “sea of imponderables.”¹⁶ To navigate its waters, the court produced the following standard for the judicial management of partisan gerrymandering:

the First Amendment and the Equal Protection clause prohibit a redistricting scheme which (1) is intended to place a severe impediment on the effectiveness of the votes of individual citizens on the basis of their political affiliation, (2) has that effect, and (3) cannot be justified on other, legitimate legislative grounds.¹⁷

In October of 2017, the Supreme Court considered whether this standard is judicially manageable.¹⁸

¹² *Common Cause v. Rucho*, 240 F. Supp. 3d 376, 378–79 (2017) (alterations in original).

¹³ *See Cooper v. Harris*, 137 S. Ct. 1455, 1463 (2017) (affirming the lower court’s finding that North Carolina’s 2016 Congressional District plan constituted an unconstitutional racial gerrymander).

¹⁴ *Common Cause*, 240 F. Supp. 3d at 378–79 (alterations in original).

¹⁵ *Whitford v. Gill*, 218 F. Supp. 3d 837, 853 (W.D. Wis. 2016).

¹⁶ *Id.* at 884 (quoting *Vieth*, 541 U.S. at 290).

¹⁷ *Gill v. Whitford*, 137 S. Ct. 2289 (2017) (No. 16-1161).

¹⁸ *See Whitford*, 218 F. Supp. 3d at 884.

Even if the *Whitford* standard holds, it will not spell the end for partisan gerrymandering. The *Whitford* standard requires a plaintiff to prove an intent to gerrymander, in addition to the effects arising from that intent.¹⁹ So far, the ample direct and circumstantial evidence arising from blatant partisan gerrymandering have made intent and effects easier to prove.²⁰ The Court in *Whitford*, however, foresaw a world where intent becomes difficult to prove as “the drafters’ intent . . . is hidden from the casual observer.”²¹

Automated districting software will enable legislatures to hide the intent and effects of their gerrymanders from all observers, casual or otherwise. By producing district plans without leaving behind the “far more direct” evidence relied upon in previous cases,²² automated districting software would obscure a legislature’s intent to gerrymander. By improving traditional districting objectives alongside partisan advantage, automated districting software would hide the effects of a gerrymander. Together, this would leave plaintiffs with a difficult evidentiary burden. Meeting this burden will require self-regulation on the part of the legislature, tailored public disclosure laws, or improved techniques for algorithmically generating alternative district plans.

This Recent Development will present its argument in three parts. Part II will explain how automated districting software will impede plaintiffs’ ability to bring claims of partisan gerrymandering by hiding a legislature’s intent to gerrymander and the effects that the gerrymander has on the district plan. Part III will explore solutions to automated districting software including third party voting commissions, transparent redistricting, and improved methods for detecting partisan gerrymanders.

¹⁹ *See id.* at 890 (explaining that they were “able to discern the legislature’s intent more easily and less intrusively because the evidence [was] far more direct”).

²⁰ *Id.*

²¹ *Id.*

²² *Id.*

II. THE EFFECTS OF AUTOMATED DISTRICTING SOFTWARE ON PARTISAN GERRYMANDERING

Drafting gerrymanders by hand must have felt like toasting a slice of bread over a campfire. The process was messy, imprecise, and left distinct, visible marks.²³ Even the term “gerrymander” originates from a district approved in 1812 by early American politician Elbridge Gerry.²⁴ The district pursued partisan advantage over traditional districting objectives like compactness or equal population, and as a result it twisted grotesquely into a salamander-like silhouette that satirists at the time dubbed a “Gerry-mander.”²⁵

Modern districting more closely resembles toasting a slice of bread on a stovetop. Technology aids drafters, but the process still requires human attention. Districting software has become increasingly accessible and convenient.²⁶ Now, state and national governments redistrict using established software.²⁷ Most state governments use semi-automated software based on Geographic Information Software (GIS),²⁸ which assists drafters and analysts by setting lines along natural boundaries and making minor adjustments where needed.²⁹ Convenient enough to warrant their price tag, semi-automated districting software still requires human drafters to construct maps and analysts to calculate values that the

²³ See Greg Miller, *The Map That Popularized the Word ‘Gerrymander’*, NAT’L GEOGRAPHIC (June 28, 2017), <https://news.nationalgeographic.com/2017/06/map-gerrymander-redistricting-history-newspaper/> (recalling how the practice of gerrymandering predates Congress and how early gerrymanders were so visually distinct as to resemble “horrid monster[s]”).

²⁴ See *id.*

²⁵ See *id.*

²⁶ See Robert G. Boatright et al., *Teaching Redistricting: Letting the People Draw the Lines for the People’s House*, 46 POL. SCI. & POL. 387, 387 (2013).

²⁷ See *autoBound*, CITYGATEGIS, <http://www.citygategis.com/products/autobound> (last visited October 18, 2017) (“AutoBound is the premier redistricting application developed by Citygate GIS AutoBound was the primary redistricting application used in over 30 states for creating the 2000 Congressional and Legislative districts.”).

²⁸ See *id.* (touting that twenty-nine U.S. state governments currently use their GIS to redistrict).

²⁹ See *id.* (enumerating the benefits of their GIS, including boundary-setting and a degree of automation).

program does not internally generate.³⁰ For example, in *Whitford*, “[t]he process of drafting and evaluating . . . alternative district maps spanned several months” and required a commissioned team of drafters and a professional analyst.³¹ Even with the aid of these technologies, legislatures still produce gerrymanders, which casual observers can visually distinguish from legitimate districts.³²

Creating districts using automated software will resemble toasting bread in a toaster. Drafters need only insert data, set the dial, and wait until the software generates a complete district plan. These programs are overwhelmingly “heuristic” in that they initially create bad plans and then refine those plans over time based on predetermined factors.³³ There are several ways to go about refining these plans ranging from slowly tweaking district boundaries all the way to rapidly generating and culling batches of plans until an acceptable plan evolves.³⁴ Whatever the method, these programs generate plans from start to finish without additional human input.

Automated districting software can produce gerrymanders “hidden from the casual observer.”³⁵ The lack of human attention during the districting process leaves behind far less evidence of a

³⁰ See *id.* Mapping software displays the boundaries between communities of interest and can adjust lines to even out population between districts. Compactness and partisan advantage, however, must be user-defined. *Id.*

³¹ *Whitford v. Gill*, 218 F. Supp. 3d 837, 891 (2016).

³² See Christopher Ingraham, *America's Most Gerrymandered Congressional Districts*, WASH. POST (May 15, 2014), https://www.washingtonpost.com/news/wonk/wp/2014/05/15/americas-most-gerrymandered-congressional-districts/?utm_term=.399426546d97 (explaining how the “funky” shape of a district “can serve as a useful proxy for how gerrymandered the district is”).

³³ See Micah Altman, *The Computational Complexity of Automated Redistricting: Is Automation the Answer?*, 23 RUTGERS COMP. & TECH. L. J. 81, 123–24 (1997). For example, automated software instructed to value compactness over equal population will sacrifice some population equality to improve compactness.

³⁴ *Id.* To do this, the software creates a population of plans that deviate slightly from the original in terms of desired factors. From that population, it selects a subset of plans which express the greatest mix of these desired factors. *Id.* The program then deletes plans falling outside of this selected subset, and it uses the remaining subset to generate the next population. *Id.*

³⁵ *Whitford*, 218 F. Supp. 3d at 890.

legislature's intent to gerrymander. Further, the pursuit of traditional districting objectives such as compactness and equal population prevents observers from using these factors as "a useful proxy for how gerrymandered the district is."³⁶

A. *How Automated Districting Software Hides the Intent to Gerrymander*

To successfully claim partisan gerrymandering, claimants must prove that the body in control of implementing the district plan gerrymandered intentionally.³⁷ Courts have considered two frameworks for these claims. Originally, courts framed gerrymandering as a Fourteenth Amendment equal protection issue.³⁸ Because political affiliation is not a universally invidious classifier like race or geography, the Supreme Court initially designed a difficult test when applying equal protection to partisan gerrymandering.³⁹ To avoid the issue of classifiers altogether, Justices Stevens and Kennedy proposed that partisan gerrymandering be framed under the First Amendment.⁴⁰ So far, the Supreme Court has rejected the First Amendment framework.⁴¹ As Justice Scalia articulated in *Vieth*, "a First Amendment claim, if it were sustained, would render unlawful *all* consideration of political affiliation in districting," but the Court had already acknowledged that some considerations of political affiliation were appropriate in

³⁶ Ingraham, *supra* note 32.

³⁷ See *Whitford*, 218 F. Supp. 3d at 884.

³⁸ See *Reynolds v. Sims*, 377 U.S. 533, 558, 562 (1964) (holding that "[l]egislatures represent people," and so Constitutional protection of political equality must mean "one person, one vote").

³⁹ See *Davis v. Bandemer*, 478 U.S. 109, 133–36 (1986) (holding that partisan gerrymandering violates equal protection only when it "substantially disadvantages certain voters" across several elections).

⁴⁰ See *Vieth v. Jubelirer*, 541 U.S. 267, 314 (2004) (Kennedy, J., concurring) (arguing that allegations of partisan gerrymandering "involve the First Amendment interest of not burdening or penalizing citizens because of their participation in the electoral process, their voting history, their association with a political party, or their expression of political views").

⁴¹ See *id.* at 281 (plurality opinion); see also *League of United Latin American Citizens v. Perry*, 548 U.S. 399, 418–19 (2006).

redistricting.⁴² These Fourteenth Amendment claims require proof of intent to discriminate.⁴³ As such, claims of partisan gerrymandering continue to require proof of discriminatory intent.

Courts consider direct and circumstantial evidence when identifying discriminatory intent.⁴⁴ In the context of partisan gerrymandering, evidence of discriminatory intent includes direct admission of intent,⁴⁵ witness testimony,⁴⁶ and documents detailing the drafting process.⁴⁷ For example, the drafters and analysts in *Whitford v. Gill* served as key expert witnesses when establishing the legislature's intent to gerrymander.⁴⁸ The drafters of the district plan in *Whitford* testified that they labeled potential plans as "Assertive" or "Aggressive" to reflect the partisan advantage that a particular plan would confer to the GOP under foreseeable circumstances.⁴⁹ The Republican legislative leadership assessed these plans based on "S" curves constructed by an analyst.⁵⁰ These "S" curves visually displayed the partisan advantage conferred by

⁴² *Vieth*, 541 U.S. at 294 (plurality opinion) (holding that some political considerations, such as competitive districts, are appropriate).

⁴³ *See* *Davis*, 478 U.S. at 127 (holding that plaintiffs bringing Fourteenth Amendment claims of partisan gerrymandering must prove that the legislature discriminated intentionally).

⁴⁴ *See* *Vill. of Arlington Heights v. Metro. Hous. Dev. Corp.*, 429 U.S. 252, 266 (1977) ("Determining whether invidious discriminatory purpose was a motivating factor demands a sensitive inquiry into such circumstantial and direct evidence of intent as may be available.").

⁴⁵ *See* *Common Cause v. Rucho*, 240 F. Supp. 3d 376, 378–79 (2017) (describing how the legislature "'acknowledge[d] freely that this would be a political gerrymander,' which [the drafting Committee member] maintained 'is not against the law'").

⁴⁶ *See* *Whitford v. Gill*, 218 F. Supp. 3d 837, 911–12 (2016).

⁴⁷ *See id.* at 850–51 (recounting documents of Wisconsin's 2012 district plan showing the emphasis placed on partisan advantage).

⁴⁸ *See id.* at 923 (finding an intent to gerrymander because "[t]he drafters themselves disproved any argument to the contrary each time they produced a statewide draft plan that performed satisfactorily on legitimate districting criteria without attaining an expected partisan advantage as drastic as [the implemented plan]").

⁴⁹ *Id.* at 849.

⁵⁰ *See id.* at 850–51 (explaining that graphs displaying the number of seats the GOP would win relative to the percentage of votes they received formed an "S" shape).

each plan across a range of possible electoral scenarios.⁵¹ One of the drafters presented their plans to the Republican caucus, and in his notes for that presentation, wrote, “[t]he maps we pass will determine who’s [in the Wisconsin Assembly] 10 years from now.”⁵²

So far, cases of gerrymandering have depended on these document trails and witness testimony to prove discriminatory intent. In *Cooper v. Harris*, the Supreme Court differentiated the plaintiffs’ successful claim of racial gerrymandering from failed claims by noting how the successful claim “turned not on the possibility of creating more optimally constructed districts, but on direct evidence of the General Assembly’s intent in creating the actual District 12.”⁵³ In *Whitford v. Gill*, recognizing the importance of the documents used to produce the gerrymandered district plan, the Wisconsin legislature resisted three court orders for document production before finally relinquishing the documents alongside a fine of \$17,000.⁵⁴ Legislatures understand the importance of these witnesses and records, and so a clear step in hiding their intent to gerrymander from the “casual observer”⁵⁵ would be to ensure that these witnesses and records never existed in the first place.

Automated districting software would accomplish an interested legislature’s goal of removing direct and circumstantial evidence of discriminatory intent from the public eye. Existing open-source software can be acquired freely and anonymously and used by individuals with limited software experience.⁵⁶ With limited development, this software could become intuitive enough for use

⁵¹ *See id.*

⁵² *Id.* at 853.

⁵³ *Cooper v. Harris*, 137 S. Ct. 1455, 1462–63 (2017) (explaining also how District 12 discriminated against black voters by diluting their voting power).

⁵⁴ *See* Matthew DeFour, *Democrats’ Short-lived 2012 Recall Victory Led to Key Evidence in Partisan Gerrymandering Case*, WIS. ST. J. (July 23, 2017), http://host.madison.com/wsj/news/local/govt-and-politics/democrats-short-lived-recall-victory-led-to-key-evidence-in/article_d5cfb956-6e93-5c81-8403-050493b5412e.html.

⁵⁵ *Whitford*, 218 F. Supp. 3d at 890.

⁵⁶ *See generally* Micah Altman & Michael P. McDonald, *BARD: Better Automated Redistricting*, J. STAT. SOFTWARE, June 2011, at 1 (presenting open source redistricting software that runs on freely available software).

by completely untrained individuals. In that case, a single member of the legislature could independently draft the state's district plan. Worse yet, a trained drafter could direct the software to produce a less extreme gerrymander that falls just out of reach of the courts' tentative attempts at judicial management.⁵⁷ This would leave potential plaintiffs with few witnesses capable of testifying to the intent behind the creation of the district plan.

Automated districting software would also do away with the document trail detailing the drafting process. Like human drafters, heuristic redistricting software generates alternative district plans as it pursues its objectives.⁵⁸ Unlike human drafters, however, automated software generates anywhere from hundreds to thousands of alternative plans in the span of minutes,⁵⁹ and the programs often delete old iterations once they are no longer needed.⁶⁰ Unless mandated by public record law, legislatures would have no need to stockpile drafted plans for analysis. Instead, they would receive a single, finished product with no trail of breadcrumbs marking the intent behind its creation.

Because automated districting software sweeps away its own breadcrumb trail, legislatures could evade accusations of removing information from the public record. Legislatures cannot withhold information from the public record if the legislature never recorded that information in the first place.⁶¹ If the lone drafter of a district plan was called as a witness and asked what they inputted into their

⁵⁷ See Transcript of Oral Argument at 50, *Gill v. Whitford*, 137 S. Ct. 2268 (2017) (No. 16-1161) (acknowledging that the proposed legal standard only intended to catch “the extreme gerrymander, the one that is fundamentally antidemocratic and is going to last for the full decade”).

⁵⁸ See Altman & McDonald, *supra* note 56, at 14–15.

⁵⁹ See *id.*

⁶⁰ See Kevin Baas, AUTO-REDISTRICT, <http://autoredistrict.org/> (last visited Nov. 11, 2017).

⁶¹ See Micah Altman et al., *Revealing Preferences: Why Gerrymanders are Hard to Prove, and What to Do about It* 14 (Mar. 22, 2015) (unpublished manuscript) (on file with Social Science Research Network), <https://ssrn.com/abstract=2583528> (explaining how in cases of partisan gerrymandering, even when courts “provide plaintiffs access to plans, reports, emails, and other information shielded from public view,” those “plaintiffs and courts will only gather as much evidence as was archived”).

districting software, the drafter could simply reply, “I did not write it down and do not remember.” How would the court distinguish between a malicious legislature attempting to defraud the public from an innocent legislature who simply wanted to cheaply and quickly draft a new district plan? The number of possible district plans for a state approaches infinity.⁶² Armed only with a copy of the program and an observable district plan, a researcher who hunts for a legislature’s intent to gerrymander would search for a needle in a haystack. Without a preemptive requirement to archive the districting process, then, legislatures will leave little to no direct or circumstantial evidence of their intent to gerrymander.

Even without these tools, strong evidence of the effects of a defendant’s action can allow courts to statistically infer the defendant’s intent. For example, disparate impact Title VII employment discrimination claims are also grounded in Fourteenth Amendment anti-discrimination law.⁶³ In these claims, plaintiffs can establish an employer’s intent to discriminate by proving “gross statistical disparities” in that employer’s practices.⁶⁴ In *Hazelwood School District v. United States*,⁶⁵ the Supreme Court compared the differences between the hiring practices of the defendant to the hiring practices of the general population.⁶⁶ This analysis assumed that absent discriminatory intent, the defendant’s hiring practices should at least resemble the hiring practices of the general public. The Supreme Court explained that trial courts should only infer an intent to discriminate when the plaintiffs proved a gross disparity between what the defendant’s hiring practices *were* and what the defendant’s hiring practices *should have been*.⁶⁷

⁶² Adam B. Cox, *Designing Redistricting Institutions*, 5.4 ELECTION L.J. 412, 419 (2006).

⁶³ See *Hazelwood Sch. Dist. v. United States*, 433 U.S. 299, 309 (1977) (holding that discriminatory hiring practiced deprived minority workers of their Fourteenth Amendment right to equal protection).

⁶⁴ *Id.* at 307.

⁶⁵ 433 U.S. 299 (1977).

⁶⁶ *Id.*

⁶⁷ See *id.* (“[A]bsent explanation, it is ordinarily to be expected that nondiscriminatory hiring practices will in time result in a work force more or less representative of the racial and ethnic composition of the population in the

Gross statistical disparity is harder to prove than ordinary disparity.⁶⁸ Circumstantial evidence can establish a disparity by showing at least some inequality.⁶⁹ Gross disparity, however, requires proof of the degree of inequality.⁷⁰ This proof must come in the form of statistical evidence, and courts have come to interpret the standard as requiring confidence stemming from statistical significance.⁷¹ As the next section will show, however, automated software makes the effects of partisan gerrymandering difficult to prove even without a requirement of statistical significance.

B. *How Automated Districting Software Hides the Effects of a Gerrymander*

Under a Fourteenth Amendment framework, intent is not enough to compel court action in the face of a partisan gerrymander. As the Supreme Court articulated in *Davis v. Bandemer*, “even if a state legislature redistricts with the specific intention of disadvantaging one political party’s election prospects, we do not believe that there has been an unconstitutional discrimination against members of that party unless the redistricting does in fact disadvantage it at the polls.”⁷² To successfully bring a claim of partisan gerrymandering, then, plaintiffs must show that the gerrymander has an effect on the district plan.⁷³

community from which employees are hired.”) (quoting *Int’l Bhd. of Teamsters v. United States*, 431 U.S. 324, 339 n.20 (1977)).

⁶⁸ See *id.* at 311–12 (“[T]he disparity between 3.7% (the percentage of Negro teachers hired by Hazelwood in 1972-1973 and 1973-1974) and 5.7% may be sufficiently small to weaken the Government’s other proof, while the disparity between 3.7% and 15.4% may be sufficiently large to reinforce it.”).

⁶⁹ See *id.* at 309 n.15 (explaining that “where relevant aspects of the decisionmaking process had undergone little change” after implementation of Title VII could serve as evidence of racial discrimination).

⁷⁰ See *id.*; see also Allan G. King, “Gross Statistical Disparities” as Evidence of a Pattern and Practice of Discrimination: Statistical Versus Legal Significance, 22 LAB. LAW. 271, 272 (2007) (noting that “lower courts frequently have turned to ‘statistical significance’ as the measuring rod” for gross disparity).

⁷¹ See King, *supra* note 70, at 272.

⁷² *Davis v. Bandemer*, 478 U.S. 109, 139 (1986).

⁷³ See *id.* (indicating that unlawful discrimination in redistricting will only be found where the redistricting “does [damage] at the polls”).

One traditional effect of a gerrymander is the loss of legitimate districting objectives such as compactness or equal population.⁷⁴ As recently as 2004, the Supreme Court considered it a “well-settled principle[.]” that “a district’s peculiar shape might be a symptom of an illicit purpose in the line-drawing process.”⁷⁵ This line of thinking stems from the fact that previous districting techniques prioritized partisan advantage at the cost of traditional districting objectives such that the resulting districts warped into unusual shapes.⁷⁶ Even gerrymanders drafted using modern mapping software can display abnormal shapes.⁷⁷ For example, North Carolina’s District 12 snakes along I-85 like a thread, precisely enveloping minority communities.⁷⁸

Some modern gerrymanders leverage mapping software to become visually indistinguishable from non-gerrymandered plans,⁷⁹ but even those plans sacrifice some traditional districting objectives to maximize partisan advantage. For example, the human drafters in *Whitford* performed an “eyeball test” to ensure that traditional districting principles did not fall outside acceptable boundaries.⁸⁰ As a result, each iteration of their district plan increased in terms of partisan advantage, but their compliance with traditional districting objectives remained steady.⁸¹ The court later held that though the drafters “were attentive to traditional districting criteria,” the effects of their gerrymander remained evident by their series of maps which “improved upon the anticipated pro-Republican advantage.”⁸²

Automated districting software can pursue these factors alongside partisan advantage.⁸³ Though this pursuit could come at

⁷⁴ See *Vieth v. Jubelirer*, 541 U.S. 267, 321 (2004) (Stevens, J., dissenting).

⁷⁵ *Id.*

⁷⁶ See *Miller*, *supra* note 23.

⁷⁷ See *Cooper v. Harris*, 137 S. Ct. 1455, 1462–63 (2017) (holding that North Carolina’s District 12 is a racial gerrymander).

⁷⁸ See *id.*

⁷⁹ *Whitford v. Gill*, 218 F. Supp. 3d 837, 889 (W.D. Wis. 2016) (“Highly sophisticated mapping software now allows lawmakers to pursue partisan advantage without sacrificing compliance with traditional districting criteria.”).

⁸⁰ *Id.* at 849.

⁸¹ See *id.*

⁸² *Id.* at 849–50.

⁸³ See *Altman & McDonald*, *supra* note 56, at 14–15.

the cost of some partisan advantage, it would confound attempts to find the effects of gerrymandering by correlating increases in one factor to increases in the other. If, for example, increases in compactness equally corresponded to increases in partisan advantage, an observer would not immediately know whether the drafters pursued partisan advantage as its own objective or, alternatively, the innocent pursuit of compactness tragically resulted in disparate partisan advantage because of natural factors.

Instead, analysis of the effects of a partisan gerrymander would depend entirely on the comparison between the partisan advantage observed in the gerrymander and the average partisan advantage that would have been observed in the absence of a gerrymander.⁸⁴ As in *Hazelwood*,⁸⁵ plaintiffs attempting to infer a discriminatory intent to gerrymander from the effects of that gerrymander would need to prove a “gross disparity” between the partisan advantage a district plan conferred and the partisan advantage that district plan *should have* conferred absent discriminatory intent. Several metrics allow experts to attribute the partisan advantage observed in a single election to the effects of a district plan.⁸⁶ The difficulty arises when attempting to determine how much partisan advantage a district plan *should have* conferred.⁸⁷

Natural factors such as political geography and shifting voter preferences significantly impact the partisan advantage conferred by a district plan.⁸⁸ Certain political groups tend to live in denser populations than others.⁸⁹ When drawing districts to maximize

⁸⁴ See *Whitford v. Gill*, 218 F. Supp. 3d 837, 920 (W.D. Wis. 2016).

⁸⁵ *Hazelwood Sch. Dist. v. United States*, 433 U.S. 299, 307 (1977).

⁸⁶ See Nicholas O. Stephanopoulos & Eric M. McGhee, *Partisan Gerrymandering and the Efficiency Gap*, 82 U. CHI. L. REV. 831, 835–36 (2015).

⁸⁷ See *Whitford*, 218 F. Supp. 3d at 920 (acknowledging that the ever-changing and difficult to measure metrics of partisan advantage make it “more difficult to draw politically competitive districts” in some parts of the state).

⁸⁸ See Jowei Chen & David Cottrell, *Evaluating Partisan Gains from Congressional Gerrymandering: Using Computer Simulations to Estimate the Effect of Gerrymandering in the US House*, 44 ELECTORAL STUD. 329, 330 (2016).

⁸⁹ Report for Defendants, Nicholas Goedert at 11, *Whitford v. Gill*, 218 F. Supp. 3d 837 (W.D. Wis. 2016) (No. 3:15-cv-00421-bbc) (explaining that Wisconsin Democrats lived in denser populations than Wisconsin Republicans).

compactness and equal population, those dense populations more likely fall in the same district. This weakens the voting strength of those political groups by unintentionally packing them together until they elect candidates by wide margins. In *Whitford*, Wisconsin successfully convinced the court that its “political geography naturally favors Republicans because Democratic voters reside in more geographically concentrated areas.”⁹⁰ Consequently, the court recognized that perfect proportionality between seats and votes could not serve as an accurate guidepost for the partisan advantage a district plan should confer in the absence of a partisan gerrymander.⁹¹

These natural factors impede the quantification of partisan advantage for establishing a gross disparity. When challenged, the plaintiffs’ experts in *Whitford* acknowledged that “partisan intent is its own independent inquiry” separate from their analyses of the district plan’s effects.⁹² The natural factors affecting partisan advantage do not lay stagnant. Even neutral district plans produce wildly disparate partisan advantages from state to state and year to year.⁹³ Tides of voters supporting an attractive candidate can create the false appearance of “packed” districts.⁹⁴ Droughts, where an otherwise dominant political party fails to muster to the polls, can tip the scales across multiple districts and create the false appearance of “cracking.”⁹⁵ Dramatic shifts in population as industries grow and

⁹⁰ *Whitford*, 218 F. Supp. 3d at 912.

⁹¹ *See id.*

⁹² Plaintiffs’ Rebuttal Report, Simon Jackman at 3, *Whitford v. Gill*, 218 F. Supp. 837 (W.D. Wis. 2016) (3:15-cv-00421-bbc).

⁹³ Report for Defendants, Nicholas Goedert at 11, *Whitford v. Gill*, 218 F. Supp. 3d 837 (W.D. Wis. 2016) (No. 3:15-cv-00421-bbc) (showing that 45% of all plans observed in Professor Simon Jackman’s historical study at some point expressed enough partisan advantage to attract judicial scrutiny under the *Whitford* standard).

⁹⁴ *See* Stephanopoulos & McGhee, *supra* note 86, at 834. A district is “packed” when a large majority of voters support one political party in excess of the number required to win that district’s election.

⁹⁵ *See id.* A district is “cracked” when a minority of voters consistently lose that district’s election by a slim margin. *Id.*

die jumble voting populations amongst existing districts.⁹⁶ Even when observation of past elections grants researchers and courts a sense of how much partisan advantage a district plan should likely confer, the wild variance inherent in any measurement of partisan advantage makes precision practically impossible.⁹⁷ Understanding this, even experts seeking to prove the effects of partisan gerrymandering openly acknowledged that their findings could not support an inference of the legislature's intent.⁹⁸

Instead, courts like that in *Whitford* do not attempt to infer the intent behind a partisan gerrymander from that gerrymander's effects.⁹⁹ The court in *Whitford* concluded that the “modest[] advantage” conferred to the Republican Party by Wisconsin's political geography failed to “explain the magnitude” of the total partisan effect of the district plan.¹⁰⁰ However, it based its decision on the less burdensome partisan effects of other plans the drafters considered but ultimately rejected.¹⁰¹ Without this context, the court acknowledged that the study of the effects of natural factors on partisan advantage “lacked specificity and careful analysis.”¹⁰² Without this necessary specificity, the court instead based its

⁹⁶ Report for Defendants, Nicholas Goedert at 18, *Whitford v. Gill*, 218 F. Supp. 3d 837 (W.D. Wis. 2016) (No. 3:15-cv-00421-bbc) (explaining how population density can affect partisan advantage).

⁹⁷ *Id.* at 15 (explaining that “within a single state, where small variations in incumbency and candidate choice may have greater impact on aggregated results, fluctuations across elections could be even larger”).

⁹⁸ Plaintiffs' Rebuttal Report, Simon Jackman at 3, *Whitford v. Gill*, 218 F. Supp. 3d 837 (3:15-cv-00421-bbc).

⁹⁹ *Whitford v. Gill*, 218 F. Supp. 3d 837, 895 n.277 (W.D. Wis. 2016) (“Although we might find the Wisconsin legislature's procedures to be counterproductive, the actions on which the plaintiffs rely appear simply to be par for the legislative course. We do not discount the possibility, however, that, in some other states, these actions may suggest a deviation from regular procedures from which an inference of discriminatory intent may arise.”).

¹⁰⁰ *Id.* at 921, 924.

¹⁰¹ *Id.*

¹⁰² *Id.* at 926–27 (presenting studies on the effects of natural geography that relied on either data gathered after the election or hypothetical alternative district plans, but neither method swayed the court.).

holding on the existence of an alternative plan that afforded much less partisan advantage to the Republican party.¹⁰³

Historically, the Supreme Court has not been amenable to the techniques which swayed the Wisconsin District Court. In *League of Latin American Citizens v. Perry*,¹⁰⁴ Justice Kennedy warned that “[e]ven assuming a court could choose reliably among different models of shifting voter preferences,” the Court would remain “wary of adopting” a standard based on “a hypothetical state of affairs.”¹⁰⁵ In *Gill v. Whitford*,¹⁰⁶ Chief Justice Roberts echoed this distaste for social science, calling the statistical evidence presented in *Whitford* “sociological gobbledygook.”¹⁰⁷ Therefore, automated districting technology interferes with the public’s ability to detect partisan gerrymandering by blurring the line between partisan advantage arising naturally and partisan advantage arising from an intentional gerrymander. This forces plaintiffs to prove the effects of gerrymandering using methods not yet accepted by the Supreme Court.

In sum, automated districting will interfere with the public’s ability to bring claims of partisan gerrymandering. By leaving behind as few as one witness and almost no documents, automated districting software will offer the public less evidence of a legislature’s intent to gerrymander. By pursuing legitimate districting factors and blurring the line between natural and unnatural partisan advantage, automated districting software will make the effects of gerrymanders even harder to detect. Combined, the features of automated districting software will worsen the already precarious state of judicial management over partisan gerrymandering. As Part III will argue, combatting these ill effects

¹⁰³ *Id.* at 926 (“[I]t is very possible to draw a map with much less of a partisan bent than Act 43 and, therefore, that Act 43’s large partisan effect is not due to Wisconsin’s natural political geography.”).

¹⁰⁴ *League of Latin Am. Citizens v. Perry*, 548 U.S. 399 (2006).

¹⁰⁵ *Id.* at 419–20 (rejecting a test which compared how each party “would fare hypothetically if they each (in turn) had received a given percentage of the vote” because it would “depend on conjecture about where possible vote-switchers will reside”).

¹⁰⁶ *Gill v. Whitford*, 137 S. Ct. 2289 (2017) (No. 16-1161).

¹⁰⁷ Transcript of Oral Argument at 40, *Gill v. Whitford*, 137 S. Ct. 2289 (2017) (No. 16-1161).

will require independent commissions, transparent districting, or improved methods for measuring the partisan effects of gerrymandering.

III. SOLUTIONS TO THE EFFECTS OF AUTOMATED DISTRICTING SOFTWARE

Claimants have fought for decades to convince courts to recognize partisan gerrymandering claims.¹⁰⁸ The advent of new technologies would not undo those decades of work and forever snatch partisan gerrymandering from the hands of the courts. Rather, automated districting software would tug partisan gerrymandering just out of the courts' immediate reach by hiding or eliminating evidence used to satisfy the intent and effect prong of the *Whitford* standard. To counteract the effects of automated districting software, then, plaintiffs, courts, or society at large could (1) allow neutral third parties to redistrict; (2) impose transparency on the redistricting process; or (3) develop techniques to more accurately measure the effects of partisan gerrymandering.

A. *Allowing Neutral Third Parties to Redistrict*

Rather than having their power to redistrict ripped from them through judicial management, legislatures could recognize the conflict of interest presented by gerrymandering and willingly surrender their Article I redistricting power to third parties.¹⁰⁹ Reformation of the redistricting process is the most clear and direct way to remove the roadblocks created by automated districting software.¹¹⁰ For example, the state governments of Arizona and California have handed off their district-drafting powers to independent commissions entrusted to draft new district plans

¹⁰⁸ See, e.g., Gerald Hebert & Marina K. Jenkins, *The Need for State Redistricting Reform to Rein in Partisan Gerrymandering*, 29 YALE L. & POL'Y REV. 543, 547 (2011) (noting that courts seriously considered suits for partisan gerrymandering since as early as *Davis v. Bandemer* in 1986).

¹⁰⁹ U.S. CONST. ART. I, § 4 (conferring to legislatures the power to determine "[t]he Times, Places and Manner of holding Elections").

¹¹⁰ See Hebert & Jenkins, *supra* note 108, at 555 ("State government reforms, on the other hand, offer the most promising avenue toward reducing excessive partisan gerrymandering.").

without partisan considerations.¹¹¹ Safety measures, such as staffing commissions with an even number of members from each political party, ensure that both parties' interests are preserved during the drafting process.¹¹²

This solution, however, depends on the Legislature's willingness to surrender their redistricting power. In 2004, only twelve states handled redistricting through third-party commissions.¹¹³ As of 2016, that number rose as ten more states reformed their respective redistricting processes.¹¹⁴ As for the remaining states, however, only time will tell. Legislatures might not willingly sacrifice the power to influence election outcomes through gerrymandering just to avoid public backlash. If particularly strong gerrymanders withstand judicial scrutiny, then dominant legislatures might escape public backlash altogether. After all, stripped of their power to vote the perpetrators out of office, the dissenting portion of the public would be left with little recourse.

Another possible response, the adoption of independent redistricting commissions, could end partisan gerrymandering altogether, or at least curb the practice. Some fear that partisan considerations will seep into third-party commissions and that the facial neutrality of the practice will shield the commissions from public suspicion.¹¹⁵ Even if the independent commissions are not faultless, they experience a less blatant conflict of interest when redistricting as compared to legislatures.¹¹⁶ Mass implementation of these commissions would overall reduce drafters' incentive to craft

¹¹¹ See *id.* at 556–57.

¹¹² See *id.* (citing as an example Arizona's five-member commission which consists of "no more than two from any political party").

¹¹³ See *Vieth v. Jubelirer*, 541 U.S. 267, 362 (2004) (Breyer, J., dissenting).

¹¹⁴ See Eric Petry, *Redistricting Reform Gains Momentum in 2016*, BRENNAN CENT. JUST. (Jan. 25, 2016), <https://www.brennancenter.org/blog/redistricting-reform-gains-momentum-2016>.

¹¹⁵ See Alan Greenblatt, *Can Redistricting Ever Be Fair?*, GOVERNING MAG. (Nov. 2011), <http://www.governing.com/topics/politics/can-redistricting-ever-be-fair.html> (explaining how the GOP in California suspected the state's independent districting commission of secretly furthering the interests of the Democratic party).

¹¹⁶ See *id.* (recalling how "there were conflicts of interest among those doing the drawing" in California's independent commission).

partisan gerrymanders, and this will ideally lead to less extreme gerrymanders nationwide.

B. *Imposing Transparency on the Redistricting Process*

Alternatively, courts or state governments could impose a degree of transparency upon the redistricting process by requiring legislatures to publish the source code of their redistricting software. Rather than forcing the public to scrounge for evidence of legislative intent after a gerrymandered plan is implemented, a transparent redistricting process would theoretically provide evidence of intent during the drafting process. The term “transparent redistricting” refers to a redistricting process where the public either actively participates in the redistricting process¹¹⁷ or at least receives enough information about the redistricting process to offer meaningful feedback or hold the drafters accountable for the district plan.¹¹⁸ Public involvement in redistricting could involve anything from close attention to a district plan by hobbyists all the way to mass internet participation through open-source redistricting software.¹¹⁹ Public disclosure of the redistricting process would, at a minimum, involve a complete record of the communications between the drafters of a plan and interested legislative parties.¹²⁰

When legislatures construct plans using automated districting software, all communications between the legislature and the

¹¹⁷ See, e.g., Micah Altman & Michael P. McDonald, *How Independent Commissions Could Use the Internet and Open Software to Maximize Transparency and Public Engagement in Redistricting*, SCHOLARS STRATEGY NETWORK (July 2014), http://www.scholarsstrategynetwork.org/sites/default/files/ssn_key_findings_altman_and_mcdonald_on_redistricting_reform_at_internet_scale_0.pdf.

¹¹⁸ See, e.g., Michael Halberstam, *Process Failure and Transparency Reform in Local Redistricting*, 11 ELECTION L.J. 446, 451 (2012) (“[F]or voters to be able to hold legislators accountable for redistricting decisions, the voting public must be properly informed about the decisions made.”).

¹¹⁹ See, e.g., Altman & McDonald, *supra* note 117.

¹²⁰ BRUCE E. CAIN & KARIN MAC DONALD, TRANSPARENCY AND REDISTRICTING: A SUPPLEMENTAL REPORT TO COMPETITION AND REDISTRICTING IN CALIFORNIA: LESSONS FOR REFORM 1–2 (2006) (“The basic components of openness are: a definition of what constitutes a meeting, notification of the meeting time and place, an agenda prepared in advance, opportunities for public input and stipulations of exceptions.”).

drafters are necessarily present in the program's code and the data used. Supplied with a redistricting software's code and the data it used, third parties could replicate that software's results to understand what, how, and why the software constructed the district.¹²¹ In other words, automated districting software could become the perfect witness for holding legislative bodies accountable for the effects of district plans, provided that the software is readily accessible to the public.¹²²

Unfortunately, legislatures may be able to withhold the information required to transform automated districting software into a perfect witness. The "Speech and Debate" clause of the Constitution provides that "for any Speech or Debate in either House, [members of the House or Congress] shall not be questioned in any other Place."¹²³ Many state constitutions parallel this clause.¹²⁴ The Supreme Court has not yet decided whether these clauses include a non-disclosure right to legislatures.¹²⁵ This uncertainty has split the federal circuits.¹²⁶ The D.C. Circuit interprets the Speech and Debate clause to confer broad non-disclosure rights, but the Ninth and Third Circuit do not.¹²⁷ In light of this uncertainty, some state courts have also interpreted the Speech and Debate clause to

¹²¹ Micah Altman & Michael McDonald, *The Promise and Perils of Computers in Redistricting*, 5 DUKE J. CONST. L. & PUB. POL'Y 69, 105 (2010) ("Full transparency thus requires that redistricting plans be made available in non-proprietary formats that are easily read . . .").

¹²² *Id.*

¹²³ U.S. CONST. ART I, § 6.

¹²⁴ See Michael L. Shenkman, *Talking About Speech or Debate: Revisiting Legislative Immunity*, 32 YALE L. & POL'Y REV. 351, 363 n.58 (2013) (noting how courts have "discussed the shared history underlying the Constitution's Speech or Debate Clause and parallel legislative immunity provisions in many state constitutions").

¹²⁵ Philip Mayer, *An Uncertain Privilege: Reexamining the Scope and Protections of the Speech or Debate Clause*, 50 COLUM. J.L. & SOC. PROBS. 229, 238 (2017) ("The Court has not resolved whether the Clause's protections 'include a privilege not to disclose documents that fall within the sphere of legislative activity, as opposed to a privilege that merely bars the evidentiary use of such documents.'") (quoting *S.E.C. v. The Comm. on Ways & Means of the U.S. House of Representatives*, 161 F. Supp. 3d 199, 238 (S.D.N.Y. 2015)).

¹²⁶ *Id.* at 238–39.

¹²⁷ *Id.*

include non-disclosure privileges for state legislatures.¹²⁸ In the context of racial gerrymandering, some have worried that, due to the difficulty of establishing intent in cases of gerrymandering, “[i]f future plaintiffs were cut off from discovering information like . . . written correspondence . . . members of Congress and redistricting bodies generally would be insulated from scrutiny by private litigants.”¹²⁹ Due to the equally difficult standard of intent for partisan gerrymandering explained in Part II, this fear should extend with equal force to cases of partisan gerrymandering.

Just as state legislatures can lend away their power to redistrict, so too can they give up the protection of the Speech and Debate clause.¹³⁰ Modeled after the Freedom of Information Act, state “sunshine laws” impose requirements on legislatures to reveal to the public information that they otherwise could have kept secret.¹³¹ To combat partisan gerrymandering, state legislatures could create for themselves a duty to record and publish the districting process, even if that process consists of code from automated districting software. As with independent commissions, however, this solution relies on the legislature’s willingness to self-regulate. Further, transparent districting at most satisfies the intent prong of the partisan gerrymandering standard. To bring a successful claim, plaintiffs still need a reliable way to measure the effects of partisan gerrymanders.

C. *Measuring the Effects of Partisan Gerrymanders to Identify Gross Disparity*

New techniques for measuring partisan advantage would allow plaintiffs to cut through the obfuscating effects of automated districting software by inferring an intent to gerrymander from that gerrymander’s effects. Inferring intent from effects requires plaintiffs to show a “gross disparity” between an observed value and

¹²⁸ Edward Collaghan, *Speech and Debate*, 16 *TOURO L. REV.* 709, 711–12 (2000) (explaining how New York state courts used the Speech and Debate Clause to justify the legislature’s non-disclosure of a “computer modeling system for the funding of public schools”).

¹²⁹ Mark Tyson, *Monitored Disclosure: A Way to Avoid Legislative Supremacy in Redistricting Litigation*, 87 *WASH. L. REV.* 1295, 1297 (2012).

¹³⁰ *See id.*

¹³¹ *Id.*

an expected value to indicate the presence of discrimination.¹³² In other words, *what happened* clearly differed from *what should have happened*. Thanks to many years of study, social scientists already have multiple metrics for partisan advantage,¹³³ or, as Chief Justice Roberts would call them, “sociological gobbledygook.”¹³⁴ Fortunately, courts already employ similar “gobbledygook”¹³⁵ in other areas of law—such as toxic torts,¹³⁶ environmental law,¹³⁷ and employment discrimination¹³⁸—without litigation devolving into an endless battle of experts. As in those other areas of law, judicial management would curb extreme abuses of law without overburdening the courts.

There is a long history of “gobbledygook”¹³⁹ persuading courts in the absence of other evidence. For example, in *Allen v. United States*,¹⁴⁰ plaintiffs alleged that open-air atomic bomb tests had resulted in multiple deaths by radiation poisoning.¹⁴¹ Though the court of appeals later found in favor of the government,¹⁴² the lower court properly articulated how statistical evidence can establish

¹³² *Hazelwood School Dist. v. U.S.*, 433 U.S. 299, 307 (1977).

¹³³ See Stephanopoulos & McGhee, *supra* note 2, at 835–36.

¹³⁴ Transcript of Oral Argument at 40, *supra* note 107, at 2289.

¹³⁵ *Id.*

¹³⁶ See Note, *Causation in Environmental Law: Lessons from Toxic Torts*, 128 HARV. L. REV. 2256, 2268 (2015) (“In toxic tort cases, findings of causation typically rely on epidemiological evidence, which relies heavily on statistical analyses and mathematical or computer modeling to make probabilistic determinations of risk and contribution.”).

¹³⁷ See *id.* at 2268–69 (explaining how environmental law claims “rely heavily on statistical and modeling methods, and these fields also tend to be able to only predict risks based on observed correlations”).

¹³⁸ See Robert Belton, *Causation in Employment Discrimination Law*, 34 WAYNE L. REV. 1235, 1281 (1988) (explaining how, even though natural factors can create wage disparities, “statistical imbalance in the work force” can nevertheless act as evidence for an intent to discriminate).

¹³⁹ Transcript of Oral Argument at 40, *supra* note 107, at 2289.

¹⁴⁰ *Allen v. United States*, 588 F. Supp. 247, 257–58 (D. Utah 1984) *overruled* by *Allen v. United States*, 816 F.2d 1417 (10th Cir. 1987).

¹⁴¹ *Id.*

¹⁴² *Allen v. United States*, 816 F.2d 1417, 1424 (10th Cir. 1987) (holding that the actions taken by the government fell under a “discretionary function exception” that prevented relief).

causation even in the absence of direct or circumstantial evidence.¹⁴³ As the power of computers increased, computer modeling became a powerful litigation tool in toxic torts and environmental law.¹⁴⁴ Specifically, in these fields, courts consider computer modeling as an “accepted and, in appropriate circumstances, reliable method . . . where contamination cannot be traced entirely to a specific source and when the extent of contamination is difficult to determine.”¹⁴⁵

As automated districting masks the source and magnitude of partisan advantage, plaintiffs bringing claims of partisan gerrymandering should similarly use computer modeling as a reliable method of proving causation. Recently, several studies have adopted new computing algorithms to generate a representative sample of randomized alternative district plans.¹⁴⁶ These studies define a solution space of possible alternative plans the legislature could have successfully submitted and then randomly generate a sample of plans within that solution space without using partisan data.¹⁴⁷ If the algorithms do not use partisan data, it would be impossible for them to intentionally generate gerrymandered district plans.¹⁴⁸ Therefore, one would expect that a large enough sample

¹⁴³ *Allen*, 588 F. Supp. at 416 (“Where the injuries are causally indistinguishable, and where experts cannot determine whether an individual injury arises from culpable human cause or non-culpable natural causes, evidence that there is an increased incidence of the injury in a population following exposure to defendant’s risk-creating conduct may justify an inference of ‘causal linkage’ between defendant’s conduct and plaintiff’s injuries.”) (citation omitted).

¹⁴⁴ See *Causation in Environmental Law*, *supra* note 136, at 2268 (“In toxic tort cases, findings of causation typically rely on epidemiological evidence, which relies heavily on statistical analyses and mathematical or computer modeling to make probabilistic determinations of risk and contribution.”).

¹⁴⁵ *City of Wichita, Kansas v. Trustees of APCO Oil Corp. Liquidating Tr.*, 306 F. Supp. 2d 1040, 1108 (D. Kan. 2003).

¹⁴⁶ See Mira Bernstein & Moon Duchin, *A Formula Goes to Court: Partisan Gerrymandering and the Efficiency Gap*, *PHYSICS AND SOC’Y* 5 (2017), <https://arxiv.org/abs/1705.10812>.

¹⁴⁷ See Gregory Herschlag et al., *Evaluating Partisan Gerrymandering in Wisconsin* 1 (2017), <https://arxiv.org/abs/1709.01596> (explaining how “none of [their] design criteria have any partisan tilt,” and so the algorithm has no data on partisan advantage with which it could craft a gerrymander).

¹⁴⁸ See *id.* (explaining how “none of [their] design criteria have any partisan tilt,” and so the algorithm has no data on partisan advantage with which it could craft a gerrymander).

generated by these algorithms would represent the average district plan a voter would receive in the absence of a gerrymander.

These studies run the risk that their simulated elections fail to accurately reflect reality.¹⁴⁹ For a district plan to fall within the solution space, it must be one that the legislature could have reasonably adopted in place of the gerrymandered plan. To be reasonably adopted, a district plan must be constitutional and desirable.¹⁵⁰ To be constitutional, a district plan must be contiguous, must have districts of relatively equal size, and must comply with the Voting Rights Act (VRA) by having enough majority-minority districts.¹⁵¹ These requirements are generally easier to measure and define. To be desirable, however, a district plan must be compact and must not split too many communities of interest.¹⁵² A plan with worm-like districts whose borders split roads and towns would be rejected even though no constitutional requirements prevent its adoption. When attempting to define a solution space for alternative district plans, these factors become problematic because they are decided based on visual scrutiny and the vague weighing of interests. Plenty of models can maximize desirable factors like compactness,¹⁵³ but the question “when would a district plan be rejected based on compactness or split-counties?” is ultimately subjective. Even when state laws require districts to be drawn so “not irregularly shaped”¹⁵⁴ or to “coincide with the boundaries of political subdivisions of the State,”¹⁵⁵ the weight of those factors against others depends on the priorities of the legislature. For example, drafters could reasonably turn down plans that maximize compactness in favor of plans with more equal population.

¹⁴⁹ See *Trustees of APCO Oil Corp. Liquidating Tr.*, 306 F. Supp. 2d at 1108 (“[A] model is only an estimate and the accuracy of the estimate depends to a considerable extent on the data selected for use in the computer model, the quality and reliability of that data and, of course, the skill of the modeler.”).

¹⁵⁰ See Herschlag et al., *supra* note 147, at 1 (designing its representative sample based on “redistricting plans that satisfy design criteria laid out in the Wisconsin constitution, statutes, and relevant court cases”).

¹⁵¹ See, e.g., Chen & Cottrell, *supra* note 87, at 336.

¹⁵² See H.B. 92, 2015 Gen. Assemb., Reg. Sess. § 1 (N.C. 2015).

¹⁵³ See, e.g., Altman & McDonald, *supra* note 56, at 4.

¹⁵⁴ N.C. H.B. 92.

¹⁵⁵ *Id.* at 92 § 120-4.54(e).

Therefore, any attempt to define a solution space for *all* possible alternative district plans risks introducing bias by objectively defining subjective boundaries.

Further, because voters do not cast new ballots for simulated district plans, researchers must use data collected from the voting tabulation districts (VTDs) of real elections. VTDs are the small polling stations where votes are tabulated before they are compiled.¹⁵⁶ They act as the smallest unit of measurement when analyzing vote distribution.¹⁵⁷ Plugging election results directly from VTDs into computer-generated district plans assumes that each VTD would have produced the same or similar vote share even under a different district plan. However, that is not necessarily the case. Just as the proportion of a minority population in a district changes that demographic's voter turnout,¹⁵⁸ so too does a political party's representation in a district change that party's voter turnout.¹⁵⁹ District plans also affect other factors that influence election results, such as campaign spending and whether to contest a district by putting forward a candidate.¹⁶⁰ Therefore, applying the VTD data from one district plan to another introduces bias because VTD data would change between district plans.

Recent approaches using Markov-Chain Monte Carlo algorithms may help to overcome these challenges.¹⁶¹ Rather than attempting to define the outer limits of a solution space for alternative district plans, these projects focus in the opposite direction by defining its solution space in terms of compliance with legitimate districting factors, such as compactness, equal population, preservation of communities of interest, and compliance

¹⁵⁶ See JONATHAN C. MATTINGLY & CHRISTY VAUGHN, REDISTRICTING AND THE WILL OF THE PEOPLE 1 (2014), <https://arxiv.org/abs/1410.8796>.

¹⁵⁷ See *id.* at 1 (designing a program to construct a representative sample of reasonable district plans using real data from Voting Tabulation Districts).

¹⁵⁸ See, e.g., Bernard Fraga, *Redistricting and the Causal Impact of Race on Voter Turnout*, 78 J. POL. 19, 19 (2015).

¹⁵⁹ See Simon Hix et al., *The Effects of District Magnitude on Voting Behavior*, 79 J. POL. 356, 360 (2017).

¹⁶⁰ See Jamie L. Carson et al., *Reevaluating the Effects of Redistricting on Electoral Competition, 1972–2012*, 14 ST. POL. & POL'Y Q. 165, 174 (2014).

¹⁶¹ See Herschlag et al., *supra* note 147, at 7; see also Chen & Cottrell, *supra* note 87, at 329.

with the VRA.¹⁶² From there, the algorithm takes a random walk through possible variations of that district plan by repeatedly tweaking the plan.¹⁶³ This process results in an “ensemble” of district plans that represent the possible district plans that could have been drafted in the absence of an intent to gerrymander.¹⁶⁴ By situating actual district plans alongside this ensemble, researchers can determine whether the real district plans fall outside the expected range of partisan advantage.¹⁶⁵ The greater the difference between the ensemble and the actual plan, the greater the likelihood that the actual plan is a partisan gerrymander.¹⁶⁶

To address the issue of different plans modifying voter behavior, these new studies do not confine themselves to a single voting outcome. Rather, they compare the performance of Republican and Democratic political parties across a range of possible voting outcomes based on multiple elections and average variation.¹⁶⁷ Because these studies considered voting outcomes beyond those observed, their results do not depend on how voters would react to their hypothetical districts. The studies address the full range of probable voting outcomes, leading their models to more closely reflect reality.

Studies generating control groups of alternative district plans through the use of computer simulation have already gained some attention in the courts. For example, during oral arguments in *Gill v. Whitford*, Justice Kagan asked whether these computer-generated plans could serve as “a way to filter out the effects of geography from the effects of partisan advantage” if plaintiffs were to provide “many, many of them, so that one can tell whether the actual map is

¹⁶² *See id.* (“The probability distribution will be concentrated on redistricting plans which better satisfy the design specified in the laws and legal precedents covering redistricting plans . . .”).

¹⁶³ *See id.* at 8.

¹⁶⁴ *See id.* at 1.

¹⁶⁵ *See id.* (explaining how the comparison between the 2012 Wisconsin district plan and an algorithmically generated ensemble of alternative plans acted as evidence that the 2012 Wisconsin plan was an intentional gerrymander).

¹⁶⁶ *Id.*

¹⁶⁷ *See id.* at 8 (explaining how the study began by testing each plan using observed election results and then expanded those tests to include voting outcomes within 7.5% of the observed values).

an outlier.”¹⁶⁸ The plaintiffs replied in the affirmative and referred to a study conducted by Jowei Chen which created 200 alternative district plans using an algorithm.¹⁶⁹ They expressed optimism in these programs, calling them “state of the art” and predicting that “they will be in the record in almost every case.”¹⁷⁰

Others have expressed less optimism. The State in *Gill* foreshadowed a time where the judicial managing of partisan gerrymandering would “shift districting from elected public officials to federal courts, who would decide the fate of maps based upon battles of the experts.”¹⁷¹ This bleak outlook considers a world where plaintiffs turn the techniques used to craft partisan gerrymanders back against the legislature.¹⁷² Instead of seeing an end to partisan gerrymandering, this situation could threaten to create a never-ending battle of experts where the prowess of the mathematician—not the facts of the case—determines the outcome. In this world of “math versus math, with democracy at stake,”¹⁷³ judicial interference with the districting process would afflict, not alleviate, the voter’s constitutional rights.

That world cannot exist in perpetuity. If courts adopt a legal standard for the judicial management of partisan gerrymandering, a wave of claims would crash into courtrooms across the nation. This will arise from the uncertainty inherent in any new legal standard involving statistical evidence.¹⁷⁴ Seeing this period of uncertainty on

¹⁶⁸ Transcript of Oral Argument at 55–56, *Gill v. Whitford*, 137 S. Ct. 2289 (2017) (No. 16-1161).

¹⁶⁹ *Id.* at 55–56.

¹⁷⁰ *Id.* at 55–57.

¹⁷¹ *Id.* at 3.

¹⁷² *Id.* at 15 (explaining how it would be fair for the public to take techniques used to create partisan gerrymanders and use “those same techniques, which have become extremely sophisticated, . . . to evaluate what they’re doing”).

¹⁷³ Jordan Ellenberg, *How Computers Turned Gerrymandering Into a Science*, N.Y. TIMES (Oct. 6, 2017), <https://www.nytimes.com/2017/10/06/opinion/sunday/computers-gerrymandering-wisconsin.html>.

¹⁷⁴ Daniel L. Rubinfeld, *Reference Guide on Multiple Regression*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 303, 309 (3d ed., 2011) (“The reality that statistical analysis generates probabilities concerning relationships rather than certainty should not be seen in itself as an argument against the use of

the horizon instills the powerful yet unfounded fear that the uncertainty will last forever. However, the initial wave of litigation will act as a period of refinement and adjustment, not as an eternal battleground for mathematicians.

The battle of experts is one-sided. When legislatures develop new ways to disguise partisan gerrymanders, they do not beat back or contest the public's ability to detect those gerrymanders. Instead, they identify the fringes of the public's ability to detect gerrymanders and create district plans that maximize partisan advantage within that undetectable zone. Since partisan gerrymandering first reached the Supreme Court, judges have recognized that legislatures can use math to hide partisan gerrymanders.¹⁷⁵ When the public could only identify gerrymanders by the naked eye, legislatures only sought to fool the human eye by complying with districting factors and appearing as a legitimate district.¹⁷⁶ Math penetrates this surface-level disguise. When faced with a representative sample of tens of thousands of alternative plans that each comply with traditional districting criteria equally well,¹⁷⁷ or an observational study demonstrating the plan's "historically large" partisan advantage,¹⁷⁸ visual similarity to legitimate districting plans fails to mask the gerrymander. Now that the public uses math to detect partisan gerrymanders, legislatures seeking to gerrymander will need to reduce the partisan advantage they incorporate into their district plans to remain undetectable. As techniques to detect partisan gerrymandering improve, this range of undetectability shrinks.

To understand this one-sided relationship, consider the following hypothetical. A factory dumps waste into an adjacent

statistical evidence, or worse, as a reason to not admit that there is uncertainty at all.”).

¹⁷⁵ See *Karcher v. Daggett*, 462 U.S. 725, 733 (1983) (explaining how “rapid advances in computer technology” allow legislatures to further “secondary goals” while complying with traditional districting factors).

¹⁷⁶ See *Whitford v. Gill*, 218 F. Supp. 3d 837, 889 (W.D. Wis. 2016) (“Highly sophisticated mapping software now allows lawmakers to pursue partisan advantage without sacrificing compliance with traditional districting criteria.”).

¹⁷⁷ See Herschlag et al., *supra* note 147, at 1.

¹⁷⁸ *Whitford*, 218 F. Supp. 3d at 908.

river. The public implements a law prohibiting the dumping of that waste. In response, the factory employs advanced mathematical techniques to determine exactly how much waste they can dump without being spotted by the naked eye. Later, the public develops a better way to test the water for the factory's waste. With all the math in the world, the factory can at best recalculate exactly how much waste it can dump without being detected by this new technique. Despite the factory's best efforts, improvements in the public's ability to detect the factory's waste will force the factory to dump less waste into the river.

Experts bringing claims against partisan gerrymanders will mirror experts detecting waste in the river, and experts defending partisan gerrymanders will mirror the experts calculating how much waste could go undetected. The ensuing battle will be less a game of tug of war and more a game of hide and seek. Continued advances in the public's ability to detect partisan gerrymandering will constrict legislatures' ability to craft those gerrymanders undetected. Due to the difficulty of measuring partisan advantage, some mathematicians predict that there may be a point where no amount of math can distinguish between an ordinary plan and a partisan gerrymander.¹⁷⁹ Even if that point exists, however, it should not prevent the judicial management of partisan gerrymandering. Until experts reach this limit of detection, judicial involvement in partisan gerrymandering will shrink the amount of partisan advantage present in district plans. In this way, improvements in the hypothetical generation of alternative district plans will allow plaintiffs to bring increasingly effective claims, even in the face of heightened burdens of proof.

IV. CONCLUSION

Without additional law or better techniques for generating alternative district plans, legislatures will sidestep claims of partisan gerrymandering by using automated districting software. For courts

¹⁷⁹ Ellenberg, *supra* note 173 (“There will be many cases, maybe most of them, where it’s impossible, no matter how much math you do, to tell the difference between innocuous decision making and a scheme—like Wisconsin’s—designed to protect one party from voters who might prefer the other.”).

to manage partisan gerrymandering, plaintiffs must bring claims under a First or Fourteenth Amendment framework, and those claims will require proof that the legislature intended to discriminate.¹⁸⁰ Presently, experts cannot infer an intent to discriminate from even “historically large”¹⁸¹ instances of partisan gerrymandering.¹⁸² This leaves potential plaintiffs with only direct evidence, such as witness testimony, or circumstantial evidence, such as the drafting process, to prove discriminatory intent. Automated districting software eliminates both categories of evidence, presenting plaintiffs with a difficult burden of proof before they can persuade courts to intervene.

New laws that hand the power to draft new districts away to independent commissions and similar laws that impose a degree of transparency on the drafting process could eliminate the need for the evidence obscured by automated districting software. More likely, however, advancements in Monte Carlo algorithms will create increasingly large and accurate representative samples of alternative districting plans. By comparing these alternative plans to actual district plans, researchers will detect gerrymandered outliers with enough significance to infer intent even when all other evidence remains hidden. Though computer-generated district plans might not spell the end for partisan gerrymandering, it at least may resolve the issues created by automated districting software, allowing for a fairer democratic process.

¹⁸⁰ See *Davis v. Bandemer*, 478 U.S. 109, 127 (1986) (holding that plaintiffs bringing Fourteenth Amendment claims of partisan gerrymandering must prove that the legislature discriminated intentionally); see also *Ashcroft v. Iqbal*, 556 U.S. 662, 676 (2009) (holding that plaintiffs bringing First Amendment claims “must plead and prove that the defendant acted with discriminatory purpose”).

¹⁸¹ *Whitford*, 218 F. Supp. 3d at 908.

¹⁸² Plaintiffs’ Rebuttal Report, Simon Jackman at 3, *Whitford*, 218 F. Supp. 3d 837 (No. 3:15-cv-00421-bbc).