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CALCULATED DISCRIMINATION: EXPOSING RACIAL
GERRYMANDERING USING COMPUTATIONAL
METHODS

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In Rucho v. Common Cause, the Supreme Court held that challenges to partisan gerrymanders presented a nonjusticiable political question. This decision threatened to discard decades of work by political scientists and other experts, who had developed a myriad of techniques designed to help the courts objectively and unambiguously identify excessively partisan district maps.

Simulated redistricting promised to be one of the most effective of these techniques. Simulated redistricting algorithms are computer programs capable of generating thousands of election-district maps, each of which conforms to a set of permissible criteria determined by the relevant state legislature. By measuring the partisan lean of both the automatically generated maps and the map put forth by the state legislature, a court could determine how much of this partisan bias was attributable to the deliberate actions of the legislature, rather than the natural distribution of the state's population.

Rucho ended partisan gerrymandering challenges brought under the U.S. Constitution—but it need not close the book on simulated redistricting. Although originally developed to combat partisan gerrymanders, simulated redistricting algorithms can be repurposed to help courts identify intentional racial gerrymanders. Instead of measuring the partisan bias of automatically generated maps, these programs can gauge improper racial considerations evident in the

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legislature's plan and demonstrate the discriminatory intent that produced such an outcome.

As long as the redistricting process remains in the hands of state legislatures, there is a threat that constitutionally impermissible considerations will be employed when drawing district plans. Simulated redistricting provides a powerful tool with which courts can detect a hidden unconstitutional motive in the redistricting process.

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INTRODUCTION

In 2004, a plurality of the Supreme Court held that challenges to partisan gerrymanders² were nonjusticiable, finding in *Vieth v. Jubelirer* that there were no judicially manageable standards by which such claims could be adjudicated.³ However, the Court's decision did not completely shut the door on future partisan gerrymandering challenges. Justice Kennedy concurred in the judgment, providing the fifth vote to uphold the challenged map. But he left open the possibility that judicially manageable standards might one day be developed that would enable federal courts to distinguish between acceptable and unconstitutional partisan gerrymanders.⁴ If "new technologies" could be developed to more precisely measure "the burdens gerrymanders impose," Justice Kennedy would find partisan gerrymandering claims justiciable.⁵

Political scientists and data scientists quickly picked up Justice Kennedy's gauntlet, developing a flurry of techniques and metrics designed to objectively identify excessively partisan district maps.⁶ Simulated redistricting software, powered by advanced machine learning algorithms, promised to be one of the most effective techniques. These algorithms take as input the state legislature's neutral and non-partisan redistricting criteria—for example, compactness, contiguity, or the desired number of majority-minority districts—and produce thousands of viable district maps satisfying those criteria.⁷ To show that a state legislature's district map was politically gerrymandered, a litigant compares the political bias of the legislature's map to the average political bias of the maps randomly generated by the simulated redistricting algorithms.⁸ In the event the legislature's map exhibits an unusually strong partisan lean compared to those produced by the algorithm, one might reasonably assume the legislature had drawn districts primarily for partisan advantage.

In the end, however, Justice Kennedy left these experts at the altar. One term after he retired, the Supreme Court in *Rucho v. Common Cause* rejected simulated redistricting tools as a source of judicially manageable standards for the detection

² This note refers to gerrymanders intended to benefit a particular political party as partisan gerrymanders, rather than political gerrymanders. Political gerrymandering is arguably a broader category, including districts drawn for the sake of incumbency protection or other political (but not necessarily partisan) ends.

³ *Vieth v. Jubelirer*, 547 U.S. 267 (2004).

⁴ *Id.* at 311 ("Relying on the distinction between a claim having or not having a workable standard of that sort involves a difficult proof: proof of a categorical negative. . . . That no such standard has emerged in this case should not be taken to prove that none will in the future.").

⁵ *See id.* at 312–13.

⁶ *See, e.g.*, Nicholas O. Stephanopoulos & Eric M. McGhee, *Partisan Gerrymandering and the Efficiency Gap*, 82 U. CHI. L. REV. 831 (2015) (arguing that maps producing a persistent efficiency gap above a certain threshold should be considered presumptively unconstitutional).

⁷ Graeme Earle, *Political Machines: The Role of Software in Enabling and Detecting Partisan Gerrymandering under the Whitford Standard*, 19 N.C. J. L. & TECH. 67 (Online Issue), 92–96 (2017).

⁸ *Id.*

of partisan gerrymanders.⁹ Instead, the Court held that no clear line could be drawn between an acceptable and unacceptable level of partisanship in redistricting—and that constitutional challenges to partisan gerrymanders therefore did not present a justiciable question.¹⁰

But simulated redistricting tools may still have a promising future. Although federal courts may not use these algorithms (or, indeed, any other technique) to overturn partisan gerrymanders, these algorithms can still help to identify *racial* gerrymanders. Since at least the 1960s, the Supreme Court has held that racially motivated redistricting not only presents a justiciable legal question, but also violates the Constitution.¹¹

Unsurprisingly, detecting racial motive in the redistricting process presents much the same challenge as detecting political motive. State legislatures are usually guarded about the unconstitutional purpose behind their discriminatory legislation.¹² Instead, they frequently obfuscate their intent by pointing to other, facially legitimate justifications for the district maps they produce.¹³ But simulated redistricting algorithms can control for these facially legitimate criteria.¹⁴ And just as a legislature's map can be compared to a set of automatically generated maps to uncover political bias, the same comparison can also be performed to identify unexplained racial bias.

Existing simulated redistricting algorithms generally require little alteration to identify racial gerrymanders. Many of the justifications that legislatures provide to obfuscate political motive are also used to justify racial gerrymanders. For example, the Voting Rights Act (VRA) generally prohibits state legislatures from drawing districts in such a way as to break up majority-minority districts—i.e., politically cohesive racial minority voting blocs numerous and geographically compact enough to comprise a majority in a single district.¹⁵ The VRA therefore opens the

⁹ *Rucho v. Common Cause*, 139 S. Ct. 2484, 2505 (2019).

¹⁰ *See id.* at 2502–06 (considering and then rejecting each test proposed by the litigants and lower courts to identify an unconstitutional partisan gerrymander).

¹¹ *See Gomillion v. Lightfoot*, 364 U.S. 339 (1960) (finding that the drawing of a municipal district with the intention to exclude African-Americans from voting in municipal elections violated the Fifteenth Amendment).

¹² Of course, state legislatures frequently admit to the consideration of racial data in their redistricting process, but generally only when they claim that the use of racial data was necessary to comply with the Voting Rights Act. *See, e.g., Ala. Legis. Black Caucus v. Alabama*, 135 S. Ct. 1257, 1263 (2015).

¹³ *See, e.g., Cooper v. Harris*, 137 S. Ct. 1455, 1472–81 (2017) (finding that North Carolina's Twelfth Congressional District was drawn on the basis of race, even though the state legislature asserted that the district was drawn purely for partisan advantage).

¹⁴ *See, e.g., Yan Y. Liu, Wendy K. Tam Cho & Shaowen Wang, PEAR: A Massively Parallel Evolutionary Computation Approach for Political Redistricting Optimization and Analysis*, 30 SWARM & EVOLUTIONARY COMPUTING 78, 81–82 (2016) (explaining how a redistricting algorithm can account for various legal and political constraints).

¹⁵ *See Thornburg v. Gingles*, 478 U.S. 30, 50–51 (1986) (explaining the test applied under section 2 of the Voting Rights Act to determine whether a multi-member district dilutes a racial minority's voting power); *Johnson v. De Grandy*, 512 U.S. 997, 1006 (1994) (explaining that the

door for legislatures to argue that their consideration of racial data in the gerrymandering process is necessary to ensure that the resulting district map does not violate the Act.¹⁶ But simulated redistricting algorithms—designed to draw the required number of majority-minority districts—will produce a realistic sample of permissible maps that the legislature could pass.¹⁷ In the event the legislature’s proposed map evinces measurably greater racial bias than those in the sample, the claimed VRA compliance motivation can be assumed to be pretextual.

Indeed, after *Rucho*, tools designed to detect hidden criteria in the redistricting process may be more necessary than ever. Now that the Supreme Court has declared partisan gerrymandering challenges nonjusticiable, it is easy to imagine that state legislatures will be particularly brazen about using their stated political motives to disguise their underlying unconstitutional goals. Indeed, the Supreme Court has already faced several such challenges.¹⁸ If partisan gerrymandering is permissible, but racial gerrymandering is not, courts adjudicating racial gerrymandering challenges must disentangle partisan and racial motives—a difficult task in jurisdictions in which race and politics are highly correlated. But to the extent that such distinctions can be detected, automated districting algorithms can help separate such motives. By holding constant the number of minority party districts, in the same way that they already hold constant the number of majority-minority districts, simulated redistricting algorithms can determine whether a proposed map’s racial bias is really the result of purely political considerations, or whether it is unexplained by constitutional criteria alone.

Of course, the Court rejected simulated redistricting as a viable tool to identify partisan gerrymanders in *Rucho*.¹⁹ But this does not suggest that it would do the same in the context of racial gerrymanders. Indeed, the Court in *Rucho* took great pains to distinguish partisan gerrymandering and racial gerrymandering, clarifying that its holding did not touch on the latter.²⁰ The line-drawing concerns that caused the Court to reject simulated redistricting in the partisan context have already been resolved with respect to racial gerrymanders.²¹ Accordingly, this Note argues that simulated redistricting algorithms present an empirically helpful and legally viable tool to identify hidden racial motive in the redistricting process.

same factors apply to single-member district challenges). *See also* CONG. RESEARCH SERV., CONGRESSIONAL REDISTRICTING AND THE VOTING RIGHTS ACT: A LEGAL OVERVIEW 2–3 (2015).

¹⁶See for example, *Ala. Legis. Black Caucus*, 135 S. Ct. at 1263, and *Cooper*, 137 S. Ct. at 1468–69, for examples of legislatures making such arguments.

¹⁷See Liu et al., *supra* note 14, at 89.

¹⁸See *Cooper*, 137 S. Ct. at 1471–82; *Easley v. Cromartie (Cromartie II)*, 532 U.S. 234 (2001).

¹⁹*Rucho v. Common Cause*, 139 S. Ct. 2484, 2505–06 (2019) (rejecting techniques that detect partisan gerrymanders by “lin[ing] up all the possible maps drawn using [the State’s districting] criteria according to the partisan distance they would produce.”).

²⁰*Id.* at 2496–97; *id.* at 2502–03.

²¹See *id.* at 2502–03 (holding that partisan motive is a permissible legislative motive); *Bethune-Hill v. Va. State Bd. Of Elections*, 137 S. Ct. 788, 794 (2017) (explaining that a district map is presumptively unconstitutional when “race was the predominant factor” behind the district’s shape (quoting *Miller v. Johnson*, 515 U.S. 900, 916 (1995))).

Part I of this Note explains the purpose and function of simulated redistricting algorithms. These algorithms were originally designed to solve the computationally difficult problem of creating a representative sample of all possible district maps. Data scientists and political scientists have since developed a number of techniques to address this problem. And although the Supreme Court has rejected the use of simulated redistricting algorithms in partisan gerrymandering challenges, that decision does not reflect any technical deficiency in the algorithms, but rather the Court's reluctance to wade into the political thicket.

Part II of this Note summarizes the law of racial gerrymandering, explaining that a district map is presumptively unconstitutional if racial motive predominated in the district drawing process. This Part also discusses common defenses to racial gerrymandering challenges, including that a district map was actually motivated by a partisan purpose, or that consideration of racial data was necessary to comply with the Voting Rights Act.

Finally, Part III of this Note argues that simulated redistricting algorithms are particularly well suited to identify racial gerrymanders. The ability to generate a representative sample of district maps can help identify any number of hidden districting criteria, not just partisan motive. And because simulated redistricting algorithms can control for the number of partisan or majority-minority districts, they can help detect whether a particular district map is justified by *Rucho*-sanctioned partisan goals or Voting Rights Act compliance.

State and federal legislatures have access to a number of means by which they can combat the problem of gerrymandering. They can rely exclusively on neutral criteria when drawing districts, defer to districts drawn by computer, delegate the redistricting process to an independent commission, or even adopt a different election system not susceptible to gerrymandering. Courts, however, have a relatively limited number of tools to address this problem—especially after *Rucho*. So long as the redistricting process remains in the hands of self-interested state legislatures, plaintiffs will seek empirical methods by which they can separate a legislature's facially legitimate motive from its hidden unconstitutional one. Even after *Rucho*, simulated redistricting provides such a method.

I. SIMULATED REDISTRICTING AND PARTISAN GERRYMANDERING

Simulated redistricting algorithms arose out of the decades-long struggle to develop judicially manageable standards for the identification of partisan gerrymanders. These algorithms made it possible to identify deviations from state legislatures' traditional districting criteria, which could include compactness, contiguity, equal population, preservation of existing political boundaries, number of majority-minority districts, and any other permissible factors.²² After all, if a

²² This Note often refers to "traditional" or "neutral" redistricting principles. However, this categorization requires three caveats. First, some of these redistricting principles are not just neutral or traditional but required by federal law. For example, a legislature's map *must* comply with the equal population principle, ensuring that districts contain roughly equal populations. *See infra* Part I.A. Additionally, district maps must often contain a certain number of majority-minority districts.

computer can draw thousands of compliant maps that, on average, demonstrate less partisan bias than the one map produced by the legislature, then the legislature's partisan intent has been laid bare.²³

This Part begins by reviewing the judiciary's earliest rulings in redistricting litigation in order to explain the context in which simulated redistricting algorithms were developed. It then examines how such algorithms work and how they were employed. Finally, this Part turns to the Supreme Court's decision in *Rucho v. Common Cause*, which rejected the use of simulated redistricting algorithms as a means of identifying partisan gerrymanders.²⁴

A. Initial Judicial Involvement in Redistricting Litigation

The Supreme Court's unambiguous rejection of partisan gerrymandering challenges marked the end of a decades-long saga. Initially, the Court was reluctant to entertain *any* challenges to Congressional or state-legislative district maps. In *Colegrove v. Green*, the Court considered a challenge to Illinois' Congressional district map, which alleged that the drawing of Congressional districts with unequal populations violated the provision of the Constitution guaranteeing each state a "Republican Form of Government."²⁵ The Court, however, rejected this challenge, holding that it presented a nonjusticiable political question.²⁶ The majority reasoned that, because "no court could affirmatively re-map" districts, any attempt to invalidate one would be a futile exercise, leaving the legislature free to reenact the

This requirement is discussed extensively in Part II.A.1. Second, though many of these principles may be facially neutral, districts drawn according to these principles can still put certain groups at a disadvantage. For example, the "compactness" principle may disadvantage voters in a racial minority. See Jason Barabas & Jennifer Jerit, *Redistricting Principles and Racial Representation*, 4 ST. POL. & POL'Y Q. 415 (2004). Third, some of these principles are susceptible to multiple definitions. For example, the "contiguity" principle might permit different parts of districts to be connected only at a single point, or it might not. And there are multiple mathematical measures of compactness. For a general discussion of these criteria, see Justin Levitt, *Where Are the Lines Drawn?*, ALL ABOUT REDISTRICTING, <https://redistricting.ils.edu/redistricting-101/where-are-the-lines-drawn/> (last visited Mar. 18, 2021).

²³ See, e.g., *Common Cause v. Rucho*, 279 F. Supp. 3d 587, 642–50 (M.D.N.C. 2018) (inferring from the results of simulated redistricting algorithms to find that North Carolina's 2016 Congressional map was drawn as a deliberate partisan gerrymander), *rev'd* 139 S. Ct. 2484 (2019).

²⁴ See *Rucho*, 139 S. Ct. at 2505–06.

²⁵ *Colegrove v. Green*, 328 U.S. 549, 556 (1946) (quoting U.S. CONST. art. IV § 4).

²⁶ *Id.* at 552 ("[D]ue regard for the effective working of our Government revealed this issue to be of a peculiarly political nature and therefore not meet for judicial determination."). The political question doctrine, tracing its origins to *Marbury v. Madison*, 5 U.S. (1 Cranch) 137, 170 (1803), prohibits federal courts from deciding issues that the Constitution commits to the political branches of government. Although a full discussion of the political question doctrine is outside the scope of this note, see ERWIN CHERMERINSKY, *FEDERAL JURISDICTION* § 2.6 (7th ed. 2016), for a summary of the doctrine's origins, operation, and justification.

same unlawful map.²⁷ Accordingly, the plaintiffs' remedy was not for the judiciary to strike down Illinois' districting plan, but for Congress to redraw the state's map.²⁸

In the 1960s, however, the Supreme Court reversed course. The Court in *Baker v. Carr* faced a case similar to *Colegrove*, challenging the unequal apportionment of state legislative districts in Tennessee.²⁹ While the challenge in *Colegrove* was brought under the Republican Guarantee clause, the challenge in *Baker* was brought under the Equal Protection Clause.³⁰ This distinction was considered dispositive.³¹ The Court explained that, unlike the Republican Guarantee clause, the Equal Protection Clause was a source of "judicially manageable standards" which could be used to resolve the case.³² Indeed, only one year later, the Court settled on a standard for unequal apportionment claims: "one person, one vote."³³ Since then, the Supreme Court has struck down a number of congressional³⁴ and state legislative district maps³⁵ that violate this equal population principle. In the context of congressional districts especially, the Court has taken this principle literally, invalidating maps with relatively miniscule deviations from equal population.³⁶

Challenges to partisan gerrymanders, however, presented a more difficult problem. Such complaints present a distinct question from that in *Baker v. Carr*. After all, a district map may be politically gerrymandered, even if each district has

²⁷ *Colegrove*, 328 U.S. at 553. Of course, courts have long since realized that they have the ability to re-map districts. Courts nowadays regularly draw district maps, often with the aid of special masters, when legislatures fail to produce a legally permissible map in time. See Nathaniel Persily, *When Judges Carve Democracies: A Primer on Court-Drawn Redistricting Plans*, 73 GEO. WASH. L. REV. 1131, 1131 (2005) ("In the many redistricting struggles that now follow each census, plaintiffs routinely turn to the courts, not only to strike down plans as illegal, but also to draw remedial plans to take their place.").

²⁸ *Colegrove*, 328 U.S. at 556. Although states are given the initial power to draw legislative districts, Congress may override states' maps for federal congressional districts. See U.S. CONST. art. I § 4.

²⁹ *Baker v. Carr*, 369 U.S. 186, 187–95 (1962).

³⁰ Compare *Colegrove*, 328 U.S. at 556 ("Violation of the great guaranty of a republican form of government cannot be challenged in the courts."), with *Baker*, 369 U.S. at 187–88 (discussing plaintiffs' allegation that they were "denied the equal protection of the laws.").

³¹ *Baker*, 369 U.S. at 228 ("We conclude, then, that the nonjusticiability of claims resting on the Guaranty Clause . . . can have no bearing upon the justiciability of the equal protection claim presented in this case.").

³² *Id.* at 226. Of course, the availability of "judicially manageable standards" is only one of several factors that the *Baker* court listed as important to the identification of a political question. But it is the factor we focus on here, because it is the one that the Court has most emphasized in the context of political gerrymandering. See *Rucho v. Common Cause*, 139 S. Ct. 2484, 2491 (2019) ("The Court . . . has struggled without success over the past several decades to discern judicially manageable standards for deciding [partisan gerrymandering] claims.").

³³ *Gray v. Sanders*, 372 U.S. 368, 381 (1963).

³⁴ See, e.g., *Wesberry v. Sanders*, 376 U.S. 1 (1964); *Karcher v. Dagget*, 462 U.S. 725 (1983).

³⁵ See, e.g., *Reynolds v. Sims*, 377 U.S. 533 (1964); *Lucas v. Forty-Fourth Gen. Assembly of Colo.*, 377 U.S. 713 (1964).

³⁶ See, e.g., *Karcher*, 462 U.S. at 727–28 (invalidating a congressional district map with only a 0.6894% difference between the populations of the least and most populous district).

an equal population.³⁷ Nevertheless, the Court in *Davis v. Bandemer* held that excessively partisan gerrymanders violated the Equal Protection Clause.³⁸ But it also felt unable to adopt a standard as absolute as “one person, one vote.” The Court’s opinion was highly fractured; although a 6-3 majority held that partisan gerrymandering claims were justiciable,³⁹ the Court also ruled 7-2 that the particular plan at issue in the case did not violate the Equal Protection Clause.

Both of these majorities shared four Justices in common, who joined together in a plurality opinion.⁴⁰ The plurality explained that the Constitution did not require proportional representation—in other words, the number of elected Democrats or Republicans did not have to match the number of Democratic or Republican voters in the voting population. According to the plurality, such a standard would have unreasonably threatened the ubiquitous use of districted plurality elections in the United States.⁴¹ The plurality opinion also explained that the Court could not invalidate every district map drawn with the intent to secure some partisan advantage, as doing so would “invite[] judicial interference in legislative districting whenever a political party suffers at the polls.”⁴² Instead, the plurality held that partisan gerrymanders only became unconstitutional when they resulted in the “continued frustration of the will of a majority of the voters or an effective denial to a minority of voters of a fair chance to influence the political process.”⁴³

This “continued frustration” standard ended up being almost impossibly difficult to meet. In the 18 years following the Court’s decision in *Davis*, relief was granted under the standard only a single time.⁴⁴ Accordingly, in 2004, the Court reconsidered its stance on partisan gerrymandering. A four-member plurality held that no judicially manageable standards existed with which such claims could be resolved.⁴⁵ The plurality rejected the standards proposed in *Davis*, as well as the standards proposed by the plaintiffs and dissenters in *Vieth*.⁴⁶ According to the plurality, standards invalidating district maps based on partisan intent failed to appreciate that the Constitution committed the drawing of districts to political

³⁷ See *Davis v. Bandemer*, 478 U.S. 109, 123 (1986) (plurality opinion). And conversely, a district map could presumably also be unequally apportioned, but still neutral with respect to race or party.

³⁸ See *id.* at 127–34 (explaining that a challenge to a partisan gerrymander might succeed when “supported by evidence of continued frustration of the will of a majority of the voters or effective denial to a minority of voters of a fair chance to influence the political process.”).

³⁹ See *id.* at 118–27 (finding partisan gerrymandering claims justiciable).

⁴⁰ *Id.* at 143 (plurality opinion) (concluding that the plan at issue did not violate the Equal Protection Clause); *id.* at 144–61 (O’Connor, J., concurring in the judgment) (arguing that partisan gerrymandering does not present a justiciable question).

⁴¹ *Id.* at 130 (plurality opinion).

⁴² *Id.* at 142.

⁴³ *Id.* at 133.

⁴⁴ *Vieth v. Jubelirer*, 541 U.S. 267, 279 (2004) (plurality opinion).

⁴⁵ *Id.* at 281.

⁴⁶ *Id.* at 281–301 (discussing each standard proposed).

branches, and therefore intended partisanship to play a role.⁴⁷ And standards based on partisan effects provided no judicially manageable line to differentiate between a constitutionally acceptable and unacceptable level of political bias.⁴⁸

Justice Kennedy concurred in the judgment, agreeing that the plurality had “demonstrate[d] the shortcomings” of existing standards.⁴⁹ But he refused to foreclose the possibility that a “limited and precise” standard would be developed in the future.⁵⁰ Even if the Court could not at that time adjudicate partisan gerrymandering claims, Justice Kennedy was optimistic that “new technologies may produce new methods of analysis that make more evident the precise nature of the burdens gerrymanders impose.”⁵¹ If manageable standards were eventually developed, Justice Kennedy would find partisan gerrymandering challenges justiciable.⁵²

Justice Kennedy’s concurrence in *Vieth* set the bar that partisan gerrymandering plaintiffs would have to meet. If experts could develop an objective standard that could identify partisan gerrymanders to Justice Kennedy’s satisfaction, then there were—in theory—five members of the Supreme Court willing to find such claims justiciable.⁵³ Among several other empirical techniques, simulated redistricting algorithms were marshaled to meet this challenge.

B. Simulated Redistricting Promised to Provide a Manageable Standard

Any standard designed to demonstrate the presence of a partisan gerrymander would need to clearly show that a map was drawn with partisan intent, as well as demonstrate that the map produced was actually biased against voters of a particular party.⁵⁴ Simulated redistricting algorithms are designed to accomplish both goals.

⁴⁷ *See id.* at 285 (“The Constitution clearly contemplates districting by political entities . . . and unsurprisingly that turns out to be root-and-branch a matter of politics.”) (citations omitted). Of course, the founders might have been surprised to hear that the Constitution they drafted showed such solicitude for partisan interests. *See* President George Washington, Farewell Address (Sep. 19, 1796), in S. PUB. NO. 115-5, at 13 (2017) (warning about the “danger of parties”); THE FEDERALIST NO. 10 (James Madison) (arguing that the Constitution was designed to prevent the dominance of any political faction).

⁴⁸ *Vieth*, 541 U.S. at 295–98 (rejecting Justice Souter’s proposed test because “[i]t does not solve . . . the original unanswerable question (How much political motivation and effect is too much?).”).

⁴⁹ *Id.* at 308 (Kennedy, J., concurring in the judgment).

⁵⁰ *Id.* at 306.

⁵¹ *Id.* at 312–13.

⁵² *Id.* at 317 (“If workable standards do emerge to measure these burdens, however, courts should be prepared to offer relief.”).

⁵³ Specifically, Justice Kennedy and the four *Vieth* dissenters.

⁵⁴ *See* Bruce E. Cain et al., *A Reasonable Bias Approach to Gerrymandering: Using Automated Plan Generation to Evaluate Redistricting Proposals*, 59 WM. & MARY L. REV. 1521, 1528 (2018) (explaining that a partisan bias test requires “an agreed-upon political fairness measure”); *id.* at 1531 (explaining that such a test must be able to identify “intentional partisan manipulation”); *see also Vieth*, 541 U.S. at 307 (Kennedy, J., concurring in the judgment) (“A determination that a gerrymander violates the law must rest . . . on a conclusion that the classifications . . . were applied

Consider, for example, a “purple” state⁵⁵ whose districting process nevertheless produced a map in which a sizable majority of districts favored a single party.⁵⁶ If most maps drawn neutrally by an algorithm produced a relatively even number of Republican and Democratic districts, and if few of the maps resulted in a partisan imbalance as severe as the one the legislature actually produced, this result would provide strong evidence suggesting that the legislature’s neutral criteria were not the only criteria that factored into the redistricting process. The randomly generated samples have demonstrated that the probability of such an extreme partisan lean occurring by chance would be relatively low, suggesting that party affiliation played a predominant role in the legislature’s design.⁵⁷ And unless the legislature can point to a neutral criterion that—when provided as a constraint on the simulated redistricting algorithm—generates maps with a partisan split closer to that of the map the legislature drew, a court could safely infer that the legislature was deliberately aiming for that partisan result.⁵⁸

The above example illustrates how simulated redistricting algorithms can be used to detect partisan *intent*. But they can also be used to demonstrate that a map has a partisan *effect* as well. Much of the difficulty in the Supreme Court’s partisan gerrymandering cases lie in the struggle to identify a neutral baseline by which partisan fairness can be measured.⁵⁹ Proportional representation did not provide such a standard.⁶⁰ Imagine, for example, a statewide winner-take-all system. Such a process might be fair to both major parties, but still produce wildly disproportionate results, electing only Democrats or only Republicans if either party received a bare plurality of the vote.⁶¹ The Court therefore rejected a proportionality standard in *Davis*.⁶² But other potential metrics for discriminatory partisan impact did not fare much better before the Court. In *Vieth*, the plurality

in an invidious manner or in a way unrelated to any legitimate legislative objective.”); *Davis v. Bandemer*, 478 U.S. 109, 133 (1986) (plurality opinion) (“In this context, such a finding of unconstitutionality must be supported by evidence of continued frustration of the will of a majority of the voters or effective denial to a minority of voters of a fair chance to influence the political process.”).

⁵⁵ That is, a state with similar numbers of voters favoring the Republican and Democratic parties.

⁵⁶ This, of course, was the situation created by North Carolina’s Congressional map in the 2016 elections. The litigation surrounding this map is discussed in more detail below. See *infra* notes 82–94 and accompanying text.

⁵⁷ A legislature defendant might try to resist this conclusion, arguing that the simulated redistricting results merely demonstrate that the legislature considered some factor *correlated* with partisan-affiliation, rather than partisan-affiliation itself. This objection is taken up in more detail in Part III.B, *infra*.

⁵⁸ See, e.g., *Common Cause v. Rucho*, 279 F. Supp. 3d 587, 642–43 (M.D.N.C. 2018), *rev’d*, 139 S. Ct. 2484 (2019).

⁵⁹ See Cain et al., *supra* note 54, at 1528.

⁶⁰ See *Davis v. Bandemer*, 478 U.S. 109, 130–32 (1986) (plurality opinion).

⁶¹ Indeed, before Congress prohibited their use in federal elections, these kinds of “general ticket” elections were often used in the United States. See 2 U.S.C. § 2c; Stephen Calabrese, *Multimember District Congressional Elections*, 25 LEGIS. STUD. Q. 611, 629 (2000).

⁶² *Davis*, 478 U.S. at 130–32.

rejected every proposed standard for being either impossible to administer, or too similar to proportionality.⁶³ Ultimately, the Court felt unable to find a standard for partisan bias that was both clear enough for courts to use, but also flexible enough not to unduly constrain the ways in which states could run their elections.

The problem with many standards, such as proportional representation or the efficiency gap,⁶⁴ is that even if they can demonstrate some kind of partisan unfairness, they cannot identify the source of the problem. Many states have populations that are naturally gerrymandered, producing disproportionality or inefficient partisan vote distribution just by their natural geography, even when districts are drawn according to neutral criteria.⁶⁵ For example, many states have urban areas in which residents overwhelmingly vote Democratic, and rural areas in which residents largely (but *not* overwhelmingly) vote Republican.⁶⁶ If voters are distributed in this way, Republican-majority districts are likely to be only weakly Republican, but Democratic-majority districts are likely to be overwhelmingly Democratic.⁶⁷ As a result, measures of partisan unfairness may reflect the state's underlying geography more than the legislature's deliberate choices. For example, elections in such a state might result in disproportionately few Democratic legislators relative to the percentage of Democratic voters, because Republican voters are optimally spread out to maximize their influence over multiple districts.⁶⁸ The measured efficiency gap is high, because so many Democratic votes are "wasted" on candidates who would have won their district elections regardless.⁶⁹

The advantage of simulated redistricting, however, is that any metric of partisan bias applied to the legislature's map can also be applied to the set of automatically generated maps.⁷⁰ It could be the case, for example, that neutrally drawn maps have a significant efficiency gap substantially favoring a particular party. But it might also be the case that the legislature's map yields an efficiency gap even more favorable to that party, which would suggest that the legislature's efforts, rather

⁶³ See *Vieth v. Jubelirer*, 541 U.S. 267, 281–84 (2004) (rejecting the standard proposed by the *Davis* plurality); *id.* at 284–90 (rejecting a standard based on the legislature's "predominant intent," coupled with a totality-of-the-circumstances effects prong); *id.* at 290–91 (rejecting Justice Powell's standard in *Davis*); *id.* at 292–95 (rejecting Justice Stevens' proposal to apply the same standard to partisan and racial gerrymanders); *id.* at 295–98 (rejecting Justice Souter's proposed five-element test, designed to detect partisan "packing" and "cracking"); *id.* at 299–301 (rejecting Justice Breyer's multi-factor balancing test).

⁶⁴ The efficiency gap was proposed by Stephanopoulos & McGhee, *supra* note 6, to measure a district map's partisan bias. The efficiency gap "represents the difference between the parties' respective wasted votes in an election—where a vote is wasted if it is (1) cast for a losing candidate or (2) for a winning candidate but in excess of what she needed to prevail." *Id.* at 834.

⁶⁵ See Cain et al., *supra* note 54, at 1533; see also David Wasserman, *Hating Gerrymandering is Easy. Fixing It is Harder.*, FIVETHIRTYEIGHT (Jan. 25, 2018), <https://fivethirtyeight.com/features/hating-gerrymandering-is-easy-fixing-it-is-harder/> (explaining that many states have geographic population distributions that naturally favor Republicans).

⁶⁶ Wasserman, *supra* note 65.

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ See Stephanopoulos & McGhee, *supra* note 6, at 834 (defining the efficiency gap).

⁷⁰ See Cain et al., *supra* note 54, at 1533.

than the natural distribution of voters, are responsible for much of the partisan disparity. Therefore, to detect a partisan gerrymander, the relevant metric is the *difference* between the average partisan lean of the generated maps and that of the map the legislature actually produced.⁷¹ If this difference is substantial, it can demonstrate that the legislature itself, rather than the state's natural geography or even the legislature's neutral districting criteria,⁷² is responsible for the map's partisan bias.

Even if simulated redistricting promised to solve the evidentiary problem, however, it still faced a technical challenge. The goal of simulated redistricting algorithms is to create a representative sample of maps that a legislature could have drawn according to its neutral districting criteria. If this sample is representative of the maps the state might have actually drawn, then it provides a fair baseline against which the legislature's map can be measured.⁷³ But generating a representative sample of district maps is no easy task.⁷⁴ If a computer were to draw lines completely randomly on a map of the state, it would be unlikely to ever generate a sensible configuration of districts that matched the legislature's highly constraining criteria.⁷⁵ And unless the maps matched those criteria, they would say nothing about the partisan lean of maps those criteria actually produce. Simulated redistricting algorithms must therefore accomplish a difficult task—to draw maps randomly enough to explore the full probability space of all maps the legislature might have drawn, but carefully enough that the maps still conform to the legislature's neutral criteria.⁷⁶

Fortunately, data scientists have available a number of battle-tested machine learning techniques, such as Markov chain Monte Carlo sampling⁷⁷ and genetic

⁷¹ *Id.* (explaining that simulated redistricting looks for “extreme departures from the mean” partisan lean of the algorithmically generated maps). There is a subtle distinction between the relevant metric used to identify partisan *intent*, and the relevant metric used to identify partisan *effect*. The partisan *effect* of the legislature's choices is simply the magnitude of the difference between the average partisan lean of the legislature's map, and the partisan lean of a neutrally drawn map. But partisan *intent* is inferred from the probability that a difference of this magnitude would have occurred by chance if the map were drawn according to non-partisan criteria. The smaller this probability is, the more likely partisan considerations played a role. *See supra* notes 54–58 and accompanying text.

⁷² If these factors were responsible, then the same bias would be reflected in the automatically generated maps as well. *See Cain et al., supra* note 54, at 1533–37.

⁷³ *See id.*

⁷⁴ *See* Micah Altman & Michael McDonald, *The Promise and Perils of Computers in Redistricting*, 70 DUKE J. CONST. L. & PUB. POL'Y 69, 81–83 (2010) for a more thorough explanation of the technical reasons why simulated redistricting is a mathematically difficult problem.

⁷⁵ *See* Wendy K. Tam Cho & Yan Y. Liu, *Sampling from Complicated and Unknown Distributions: Monte Carlo and Markov Chain Monte Carlo Methods for Redistricting*, 506 PHYSICA A 170, 171–72 (2018) (discussing the difficulty designing an algorithm that can fully explore a multi-dimensional and non-continuous space).

⁷⁶ *Id.*

⁷⁷ *See, e.g.,* Gregory Herschlag et al., *Quantifying Gerrymandering in North Carolina*, ARXIV (Jan. 9, 2018), <https://arxiv.org/pdf/1801.03783.pdf> (using Markov chain Monte Carlo algorithms

algorithms⁷⁸ to generate large samples of representative district maps. These algorithms are sufficiently configurable that they can accommodate a diverse set of redistricting criteria, including contiguity, compactness, equal population, and the preservation of communities of interest and majority-minority districts. And they are also sufficiently powerful that they can comprehensively explore the probability space of compliant districts, ensuring that the generated districts provide a genuinely representative sample.

C. After Initial Success at Trial, Simulated Redistricting Is Rejected by the Supreme Court

Simulated redistricting algorithms saw initial success at the trial court level.⁷⁹ The District Court proceedings in *Common Cause v. Rucho* illustrate how plaintiffs were able to effectively employ algorithmic evidence.⁸⁰ In that case, the plaintiffs challenged the congressional district map drawn by North Carolina's Republican-controlled state legislature before the 2016 elections.⁸¹ Although Republicans only won 53% of the vote in the 2016 North Carolina Congressional elections, they won 10 out of the state's 13 seats in the House of Representatives.⁸² To succeed on their claim, the plaintiffs were required to demonstrate that the district map was drawn with the intent to achieve a partisan result, and that these results were actually caused by the design of that map, rather than the state's natural political geography.⁸³

for simulated redistricting). Monte Carlo algorithms attempt to estimate a target distribution by randomly sampling from the distribution and inferring the true distribution from the random samples. However, this method is computationally intractable for complicated problems, such as redistricting, in which the distribution's parameters can vary along a high number of dimensions. Markov chain Monte Carlo algorithms therefore do not sample completely at random. Instead, the location from which each sample is drawn is informed by the results of the previous sample. For a helpful explanation, see Jason Brownlee, *A Gentle Introduction to Markov Chain Monte Carlo for Probability*, MACHINE LEARNING MASTERY (Nov. 6, 2019), <https://machinelearningmastery.com/markov-chain-monte-carlo-for-probability>.

⁷⁸ Liu et al., *supra* note 14 (simulated redistricting using genetic algorithms). Genetic algorithms are designed to mimic the process of natural selection. They attempt to optimize a model according to a given definition of fitness by taking a population of models, determining which are the most fit, and then producing a new generation of models based on only the most fit models of the previous generation. For further explanation, see Jason Brownlee, *Simple Genetic Algorithm from Scratch in Python*, MACHINE LEARNING MASTERY (Mar. 3, 2021), <https://machinelearningmastery.com/simple-genetic-algorithm-from-scratch-in-python>.

⁷⁹ See, e.g., *Whitford v. Gill*, 218 F. Supp. 3d 837 (W.D. Wis. 2015) (invalidating a partisan gerrymander, in part on the basis of evidence produced by simulated redistricting), *rev'd*, 138 S. Ct. 1916 (2018).

⁸⁰ 279 F. Supp. 3d 587 (M.D.N.C. 2018), *rev'd*, 139 S. Ct. 2484 (2019).

⁸¹ *Id.* at 597.

⁸² *Id.* at 657.

⁸³ *Id.* at 637 (“Plaintiffs further propose—and we agree—that if Plaintiffs establish that the 2016 Plan was enacted with discriminatory intent and resulted in discriminatory effects, the plan will nonetheless survive constitutional scrutiny if its discriminatory effects are attributable to the state's political geography or another legitimate redistricting objective.”).

The state made the plaintiffs' burden easy with respect to the intent prong: the legislator responsible for drawing the district map openly admitted that he did so in order to maximize the number of Republican seats.⁸⁴ But to demonstrate that this intent actually had an impact on the election's outcome, the plaintiffs called upon expert witnesses who had analyzed the district map using simulated redistricting algorithms.⁸⁵ The plaintiffs' first expert witness used an algorithm to randomly draw 24,518 congressional district maps, each one compatible with the state's neutral and legitimate districting criteria, including "compactness, contiguity, maintaining integrity of political subdivisions, and . . . compliance with the Voting Rights Act."⁸⁶ Almost 80% of plans produced by the algorithm produced either 6 or 7 Republican districts.⁸⁷ By contrast, only 0.7% of plans resulted in a victory for 10 Republicans and 3 Democrats—the actual result of the 2016 election.⁸⁸ The plaintiffs also introduced another expert witness, who had drawn 1,000 district maps using a simulated redistricting algorithm.⁸⁹ Not a single one of these maps resulted in a partisan split as biased toward Republicans as the map the legislature actually drew.⁹⁰

Both the legislature and the redistricting algorithms were tasked with drawing congressional district maps over the same geographical distribution of North Carolina residents. But while the algorithmically drawn maps produced a relatively equal number of red and blue districts, the legislature's map overwhelmingly favored Republicans.⁹¹ The court therefore concluded that the legislative map's extreme partisan bias was most likely due to the legislature's intentional plan to enact a partisan gerrymander.⁹²

The district court's decision showed that simulated redistricting algorithms could successfully assist courts in identifying partisan gerrymanders. This success, however, was short-lived. One year later, the Supreme Court in *Rucho v. Common Cause* heard an appeal of the decision, and reversed, holding that there was no "judicially discernible and manageable" definition of a partisan gerrymander.⁹³

The Court acknowledged that the specific maps challenged in the case were "highly partisan, by any measure."⁹⁴ Nevertheless, the Court declined to invalidate

⁸⁴ *Id.* at 652 ("Most significantly, in explaining the proposed Partisan Advantage criterion to the Committee, Representative Lewis said 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.'") (alteration in original).

⁸⁵ *Id.* at 642–47.

⁸⁶ *Id.* at 643 (citing *Harris v. Ariz. Indep. Redistricting Comm'n*, 136 S. Ct. 1301, 1306 (2016) for a list of neutral districting criteria).

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ *Id.* at 646.

⁹⁰ *Id.* at 647.

⁹¹ *Id.* at 642–47.

⁹² *Id.* at 667.

⁹³ 139 S. Ct. 2484 (2019).

⁹⁴ *Id.* at 2491.

them, claiming that no judicially manageable standards existed by which constitutionally permissible redistricting could be distinguished from unconstitutional partisan gerrymandering.⁹⁵ The Court considered an approach that, as with simulated redistricting, would “line up all the possible maps drawn using [neutral] criteria according to the partisan distribution they would produce,” and then measure the difference between the partisan lean of the legislature’s map and the median map.⁹⁶ However, the Court rejected this approach for two reasons.

First, the Court explained that the technique “would return us ‘to the original unanswerable question (How much political motivation and effect is too much?).’”⁹⁷ The Court was unwilling to invalidate *every* map drawn with any partisan motive.⁹⁸ Simulated redistricting may have been able to provide an accurate metric of partisan bias capable of isolating the effects of the state’s redistricting process—but that metric still leaves the Court to decide how much partisan bias is too much.⁹⁹ Simulated redistricting may have provided a straightedge, but the Court still needed to decide where to draw the line.

Second, the Court objected to the fact that a measure of partisan bias based on deviation from the legislature’s neutral criteria would “vary from State to State and year to year.”¹⁰⁰ Because the baseline for partisan neutrality would vary based on what legislators “said they set out to do,” the Court argued that such a standard would be “indeterminate and arbitrary.”¹⁰¹ This objection is a little harder to understand than the first. Given the Court’s reluctance to impose a uniform standard of fairness on all state legislatures, one would think that the Court would prefer to use each state legislature’s non-partisan definition of fairness as a neutral baseline.¹⁰² Nevertheless, the majority was clearly uncomfortable with a measure of a map’s partisan impact that depended so heavily on the legislature’s purported motives.

* * *

For years after *Vieth*, experts worked to develop “clear, manageable, and politically neutral” standards to identify partisan gerrymanders.¹⁰³ They developed the robust simulated districting algorithms described in this Part. But in *Rucho*, the Court declared this problem unsolvable. However, the *Rucho* decision need not

⁹⁵ *See id.* at 2502.

⁹⁶ *Id.* at 2505–06.

⁹⁷ *Id.* (quoting *Vieth v. Jubelirer*, 541 U.S. 267, 296–97 (2004) (plurality opinion)).

⁹⁸ *Id.* at 2497 (“[W]hile it is illegal for a jurisdiction to depart from the one-person, one-vote rule, or to engage in racial discrimination in districting, a jurisdiction may engage in constitutional political gerrymandering.”) (internal quotations omitted).

⁹⁹ *See Cain et al., supra* note 54, at 1538–39 (explaining that, even given an accurate measure of partisan bias, courts would still need to decide how that measure relates to the constitutionality of the legislature’s district map).

¹⁰⁰ *Rucho*, 139 S. Ct. at 2505.

¹⁰¹ *Id.*

¹⁰² *See id.* at 2521 (Kagan, J., dissenting) (arguing that the adaptability of this approach to a legislature’s own districting criteria is “a feature, not a bug”).

¹⁰³ *Vieth v. Jubelirer*, 541 U.S. 267, 307–08 (2004) (plurality opinion).

mean the end of simulated redistricting. As Part II of this Note explains, the problems that caused the Court to reject simulated redistricting as a way to detect partisan gerrymanders have already been solved with respect to racial gerrymanders.

II. IDENTIFYING A RACIAL GERRYMANDER

This Part briefly explains the history and law of racial gerrymandering. The detection of racial gerrymanders presents many of the same challenges as the detection of partisan gerrymanders. Yet, though the Supreme Court has declared partisan gerrymandering challenges nonjusticiable, it has long held that states may not engage in intentional racial gerrymandering.¹⁰⁴ Under Supreme Court precedent, district maps are presumptively unconstitutional when “race [is] the predominant factor motivating” the legislature’s line-drawing decisions.¹⁰⁵ However, application of this test presents two challenges. First, the VRA prohibits states from diluting the voting power of racial minorities, even unintentionally.¹⁰⁶ Legislatures must therefore consider race just enough to avoid violating the VRA, but not so much as to create a racial gerrymander.¹⁰⁷ Second, racial gerrymanders and partisan gerrymanders often look remarkably similar—but the Supreme Court has permitted the latter, while forbidding the former.¹⁰⁸ Courts therefore face the challenging task of distinguishing between district lines permissibly drawn on the basis of party, and lines impermissibly drawn on the basis of race. Following this Part’s discussion these two problems, the following Part will explain how simulated redistricting can offer courts a powerful tool with which to address both of these difficulties.

A. *The Constitution and the Voting Rights Act Provide Separate Causes of Action*

In the partisan gerrymandering context, the Supreme Court struggled to find any standard of partisan bias that gave rise to constitutional injury. In the racial gerrymandering context, by contrast, there are at least two. Under the VRA, a district map is presumptively invalid if it dilutes the vote of a politically cohesive

¹⁰⁴ Compare *Rucho*, 139 S. Ct. at 2484 (holding partisan gerrymandering challenges nonjusticiable), with *Shaw v. Reno*, 509 U.S. 43 (1993) (holding intentional racial gerrymanders unconstitutional).

¹⁰⁵ *Miller v. Johnson*, 515 U.S. 900, 916 (1995).

¹⁰⁶ See *infra* Part II.A.1 (describing the development of this VRA standard for vote dilution).

¹⁰⁷ See *Bethune-Hill v. Va. State Bd. of Elections*, 137 S. Ct. 788, 801 (2017) (explaining that the predominant consideration of race is acceptable only if states have a “strong basis in evidence” to think that it needed to consider race to comply with the VRA (quoting *Ala. Legis. Black Caucus v. Alabama*, 135 S. Ct. 1257, 1274 (2015))).

¹⁰⁸ See *Cooper v. Harris*, 137 S. Ct. 1455, 1473 (2017) (“And crucially, political and racial reasons are capable of yielding similar oddities in a district’s boundaries. That is because, of course, ‘racial identification is highly correlated with political affiliation.’”) (quoting *Cromartie II*, 532 U.S. 234, 243 (2001)). See also *supra* note 104.

and geographically compact racial minority.¹⁰⁹ And under the Constitution, a district map is presumptively invalid if the district boundaries were intentionally and predominantly drawn on the basis of race.¹¹⁰

1. The Voting Rights Act Creates an Effects-Based Test for Vote Dilution

The injury in the Supreme Court’s initial gerrymandering cases was relatively clear. In *Gomillion v. Lightfoot*, for example, the state’s redefinition of municipal boundaries was intended to entirely remove African-American voters from municipal elections.¹¹¹ But soon, the Court began to face challenges to election systems that suppressed the minority vote through the “dilution of voting power” rather than “an absolute prohibition on casting a ballot.”¹¹²

The standard used to adjudicate vote dilution challenges is the result of a joint effort—or, depending on one’s view, a power struggle—between the Supreme Court and Congress. In the 1970s, the Supreme Court began to hear cases in which multi-member districts were challenged for diluting the vote of racial minorities.¹¹³ The Court took a holistic approach to these challenges. It held that a multi-member district was not inherently unconstitutional just because the elections held within it had resulted in underrepresentation of a minority group.¹¹⁴ But such a district would become invalid when it produced an election process “not equally open to participation by the group in question.”¹¹⁵ The Court considered a number of factors in making this determination, including the “history of official discrimination” in the relevant jurisdiction,¹¹⁶ the size of the district,¹¹⁷ the availability of mechanisms for candidates to run from specific geographic subdivisions,¹¹⁸ and the cultural distinctiveness of the relevant group.¹¹⁹

In the end, however, the court determined that one factor was always necessary. In *City of Mobile v. Bolden*, the Supreme Court held that racial vote dilution only violated the Constitution when the legislature *intended* to discriminate on the basis of race.¹²⁰ And because the language of the VRA at the time closely reflected the

¹⁰⁹ See *Thornburg v. Gingles*, 478 U.S. 30, 50–51 (1986).

¹¹⁰ *Miller*, 515 U.S. at 916.

¹¹¹ 364 U.S. 339 (1960).

¹¹² *Allen v. State Bd. of Elections*, 393 U.S. 544, 569 (1969).

¹¹³ *Whitcomb v. Chavis*, 403 U.S. 124 (1971); *White v. Regester*, 412 U.S. 755 (1973).

¹¹⁴ *Whitcomb*, 403 U.S. at 142–44.

¹¹⁵ *White*, 412 U.S. at 765.

¹¹⁶ *Id.* at 766.

¹¹⁷ *Whitcomb*, 403 U.S. at 143.

¹¹⁸ *Id.* at 144.

¹¹⁹ *White*, 412 U.S. at 768.

¹²⁰ 446 U.S. 55, 62 (1980) (“Our decisions, moreover, have made clear that action by a State that is racially neutral on its face violates the Fifteenth Amendment only if motivated by a discriminatory purpose.”). This holding drew on the Court’s then-recent equal protection cases, which held that racial discrimination only offended the Equal Protection Clause when it was intentional. See *Washington v. Davis*, 426 U.S. 229 (1976); *Pers. Adm’r of Mass. v. Feeney*, 442 U.S. 256 (1979).

language of the Fifteenth Amendment, the Court also held that the VRA, too, was offended only by purposeful racial discrimination.¹²¹

Congress reacted strongly to the Court's decision. Believing that *Bolden* had effectively overturned the Court's prior vote dilution cases, Congress passed the Voting Rights Act Amendments of 1982, in order to restore the "totality of the circumstances" test that it understood the Court's previous cases to require.¹²² Under the amended VRA, a violation occurs when "based on the totality of the circumstances, it is shown that the political processes leading to nomination or election in the state or political subdivision are not equally open to participation by members of a class of citizens" protected by the Act.¹²³ Much of this language is taken directly from the Court's prior opinions, which did not, at least expressly, contain any intent requirement.¹²⁴

The 1982 amendments adopted a totality of the circumstances test for racial vote dilution claims, instructing the courts to consider any number of factors that might arise.¹²⁵ But in *Thornburg v. Gingles*, the Court boiled this set of factors down to three.¹²⁶ Under *Gingles*, a district map results in vote dilution when it denies a single-member district to a minority group that is (1) "sufficiently large and geographically compact to constitute a majority in a single-member district,"¹²⁷ (2) "politically cohesive,"¹²⁸ and (3) opposed by bloc voting from the racial majority population.¹²⁹ If all three factors are met, then the VRA's "totality of the circumstances" test is presumptively satisfied, and a racial vote dilution claim may succeed.¹³⁰

Unlike *Bolden*, *Gingles* did not provoke swift Congressional backlash. Instead, the *Gingles* factors continue to be applied, not just in challenges to multi-member districts, but for single-member districts as well.¹³¹ In this context, the *Gingles* test

¹²¹ See *City of Mobile*, 446 U.S. at 60–62.

¹²² See Voting Rights Act Amendments of 1982, Pub. L. No. 97-205, 96 Stat. 131; 52 U.S.C. § 10301(b).

¹²³ 52 U.S.C. § 10301(b).

¹²⁴ Compare 52 U.S.C. § 10301(b) (requiring "political processes" to be "equally open to participation" by protected groups), with *White*, 412 U.S. at 766 (requiring "political processes" to be "equally open to participation" by protected groups).

¹²⁵ 52 U.S.C. § 10301; S. REP. NO. 97-417, at 28–29 (1982), as reprinted in 1982 U.S.C.C.A.N. 177, 206–07 (listing typical factors to be considered under the amended VRA's vote dilution test).

¹²⁶ 478 U.S. 30 (1986).

¹²⁷ *Id.* at 50.

¹²⁸ *Id.* at 51.

¹²⁹ *Id.*

¹³⁰ Although maps satisfying the *Gingles* test presumptively violate the Voting Rights Act, there are circumstances in which the *Gingles* factors are met, but no violation has occurred. For example, in *Johnson v. De Grandy*, 512 U.S. 997 (1994), the Supreme Court held that the creation of a majority-minority district was not required if a minority group already had control over a number of districts proportional to their population, or if the creation of a majority-minority district for one minority would come at the expense of a district for another minority.

¹³¹ See, e.g., *League of United Latin Am. Citizens v. Perry*, 548 U.S. 399, 425–27 (2006) (applying the *Gingles* factors to single-member districts).

essentially requires the creation of a majority-minority district in areas with racially polarized voting whenever such a majority-minority district is geographically plausible. In other words, if a state with racially polarized voting has a minority population geographically compact and large enough to comprise a majority in a single district, the state must give that population its own district. The drawing of such majority-minority districts has become a major part of the redistricting process in many states. As racial polarization has persisted, if not increased, since 1982, states must take care to ensure that they do not draw lines through geographically compact minority populations, lest they risk violating the VRA.¹³²

At the same time, however, the 1982 amendments did not slam the door on the intent requirement. Since then, the Court has continued to develop its constitutional test for intentional discrimination. The result is a tightrope for state legislatures to walk. States must consider race just enough to ensure they do not violate the VRA, but not so much as to violate the Constitution in the process.

2. The Equal Protection Clause Provides an Intent-Based Test for Racial Gerrymandering

The Constitution provides a separate cause of action to challenge racial gerrymandering. Whereas the Voting Rights Act Amendments of 1982 established an effects-based test for a violation, in a constitutional challenge intent is key. In *Bolden*, the Court held that the intentional consideration of race was a necessary element of a constitutional racial gerrymandering claim.¹³³ And in subsequent cases, the Court went even further. The Court's decisions quickly established that the intentional consideration of race when drawing district boundaries was not just a necessary element of a gerrymandering claim, but a sufficient one as well.

At first, the Court's cases suggested that, to constitute a racial gerrymander, the state legislature's consideration of race must be obvious just by looking at the district map. In *Shaw v. Reno*, the Court invalidated a congressional district under the Fourteenth Amendment when the district's shape was "so bizarre on its face that it [was] 'unexplainable on grounds other than race.'"¹³⁴ This test, however, had limited force. While hand-drawn gerrymanders may have produced bizarre looking districts, as automated redistricting has become more ubiquitous, it has also become easier to draw innocuous-looking districts that are nevertheless carefully crafted to achieve particular goals.¹³⁵ The Court therefore clarified shortly after *Shaw* that a bizarre shape was not necessary to make out a gerrymandering claim; instead, a plaintiff would only have to show "that race was the predominant factor motivating

¹³² See Stephen Ansolabehere et al., *Regional Differences in Racial Polarization in the 2012 Presidential Election: Implications for the Constitutionality of Section 5 of the Voting Rights Act*, 126 HARV. L. REV. F. 205 (2013) (finding a recent increase in racially polarized voting in jurisdictions covered by the Voting Rights Act's now defunct preclearance requirement).

¹³³ *City of Mobile v. Bolden*, 446 U.S. 55, 60 (1980).

¹³⁴ 509 U.S. 630, 644 (1993) (quoting *Vill. of Arlington Heights v. Metro. Hous. Dev. Corp.*, 429 U.S. 252, 266 (1977)).

¹³⁵ Earle, *supra* note 7, at 72–85 (explaining how automated redistricting software can draw gerrymandered districts without leaving a visible mark).

the legislature's decision to place a significant number of voters within or without a particular district."¹³⁶

This test places substantial emphasis on the legislature's intent but requires little to no demonstration of any resulting negative impact on a racial group's voting strength. The Court in *Shaw* held that racial gerrymanders offend the Constitution even when they do not "dilute[] a racial group's voting strength."¹³⁷ Indeed, drawing on its affirmative action precedents, the Court explained that racial gerrymanders must be strictly scrutinized even "when district lines are drawn to favor the minority," because racial classifications can be harmful in and of themselves.¹³⁸ Nor does the Court's test require a demonstration of any "expressive harm" caused by an obviously gerrymandered district's offensive shape.¹³⁹ Instead, a racial gerrymander is subject to strict scrutiny whenever race is the "predominant, overriding factor" in the drawing of a particular district.¹⁴⁰

B. Distinguishing Racial Gerrymandering and VRA Compliance

As noted earlier, simulated redistricting can help overcome two challenges posed when identifying racial gerrymanders. The first arises from the interaction between the Constitution's intent test for racial gerrymanders and the VRA's effects test for racial vote dilution: what if a state considers race when drawing a district in order to avoid a VRA violation? After all, a state with racially polarized voting may be unable to ignore race entirely, because it might accidentally draw district lines in such a way as to break up a geographically compact racial minority group.¹⁴¹ But under the *Shaw* line of cases, the state also cannot let race predominate in the districting process, or else its map will be strictly scrutinized.¹⁴² Put together, these tests put states in a double bind, trapping legislatures between the Fourteenth Amendment on the one hand, and voting rights legislation designed to enforce it on the other.

The Supreme Court, however, has created two escape routes for state legislatures. First, the "predominant intent" standard is more lenient than the normal test for racial discrimination. Most legislation is strictly scrutinized whenever racial

¹³⁶ *Miller v. Johnson*, 515 U.S. 900, 916 (1995).

¹³⁷ *Shaw*, 509 U.S. at 650.

¹³⁸ *Id.* (emphasis added).

¹³⁹ Compare Richard H. Pildes & Richard G. Niemi, *Expressive Harms, "Bizarre Districts," and Voting Rights: Evaluating Election-District Appearances After Shaw v. Reno*, 92 MICH. L. REV. 483, 484 (1993) (arguing that "only election-district configurations that convey a dramatic visual impression of this sort implicate the principles of *Shaw*"), with *Miller*, 515 U.S. at 916 (rejecting a constitutional test for racial gerrymanders that required such dramatic visual impressions).

¹⁴⁰ *Miller*, 515 U.S. at 920.

¹⁴¹ See, e.g., *Bethune-Hill v. Va. State Bd. of Elections*, 137 S. Ct. 788, 800–02 (2017) (finding that Virginia reasonably believed that it needed to consider race in order to avoid diluting the minority vote).

¹⁴² See *id.* at 797; *Miller*, 515 U.S. at 916.

discrimination forms part of the motivation behind it.¹⁴³ But legislatures drawing district maps are allowed to consider race to an extent.¹⁴⁴ For a district map to be strictly scrutinized under the Equal Protection Clause, race must have been the legislature's *predominant* motive, subordinating consideration of all neutral redistricting criteria.¹⁴⁵ Accordingly, states may still take race into account in order to ensure that they do not break up majority-minority districts, so long as they place more emphasis on traditional districting principles.¹⁴⁶

Second, the Supreme Court has assumed (though not definitively decided) that compliance with the VRA is a compelling government interest.¹⁴⁷ Therefore, even though a district drawn with a predominantly racial motive triggers strict scrutiny, that district may still survive judicial review when the state has a “strong basis in evidence” to believe that the consideration of race was necessary to comply with the VRA.¹⁴⁸

These safety valves, however, do not relieve all of the pressure that the Court's racial gerrymandering cases have placed on the VRA. Before *Shelby County v. Holder*, many states could not implement a new district map without receiving preclearance from the Department of Justice.¹⁴⁹ Yet, since *Shaw*, the Supreme Court has several times invalidated majority-minority districts that legislatures insisted were necessary to avoid the dilution of a racial minority's voting power, even when the state's previous map failed preclearance for containing too few majority-minority districts.¹⁵⁰ The Court has also interpreted the VRA narrowly, holding in *Bartlett v. Strickland* that the Act does not require states to create “crossover” districts—i.e., districts in which a racial voting bloc comprising a minority in the district can still elect the candidate of its choice with the assistance of some members of the racial majority.¹⁵¹ As a result, states' ability to draw districts to favor racial minorities is highly limited, as the creation of such districts must be required by the Court's precise interpretation of the VRA.

¹⁴³ *Cf.* *Pers. Adm'r of Mass. v. Feeney*, 442 U.S. 256, 279 (1979) (“Discriminatory purpose . . . implies that the decisionmaker . . . selected or reaffirmed a particular course of action at least in part ‘because of,’ not merely ‘in spite of,’ its adverse effects upon an identifiable group.”).

¹⁴⁴ *Cromartie II*, 532 U.S. 234, 241 (2001) (“Race must not simply have been a motivation for the drawing of a majority-minority district, but the *predominant* factor motivating the legislature's districting decision.”) (internal quotations and citations omitted).

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ *Bethune-Hill*, 137 S. Ct. at 801 (“As in previous cases, therefore, the Court assumes, without deciding, that the State's interest in complying with the Voting Rights Act was compelling.”).

¹⁴⁸ *Id.*

¹⁴⁹ 570 U.S. 529 (2013); *see also* CHARLES S. BULLOCK ET AL., *THE RISE AND FALL OF THE VOTING RIGHTS ACT* 34 (2016) (finding that redistricting changes were much more likely than other election changes to result in preclearance objections).

¹⁵⁰ *See, e.g.,* *Shaw v. Reno*, 509 U.S. 630 (1993); *Miller v. Johnson*, 515 U.S. 900 (1995); *League of United Latin Am. Citizens v. Perry*, 548 U.S. 399 (2006); *Ala. Legis. Black Caucus v. Alabama*, 135 S. Ct. 1257 (2015); *Cooper v. Harris*, 136 S. Ct. 2512 (2017). Of course, since *Shelby County v. Holder*, 133 S. Ct. 2612 (2013), states are no longer subject to preclearance review.

¹⁵¹ 556 U.S. 1 (2009).

Even though the Court's racial gerrymandering jurisprudence has constrained the application of the VRA, judicial skepticism of race-based redistricting may be beneficial to minority representation in some circumstances. The VRA, as interpreted in *Thornburg v. Gingles*, seeks to increase the number of districts in which racial minorities can elect the candidates of their choice.¹⁵² But while this enhances minority representation within those districts, it may hinder minority representation overall. If minority groups are concentrated within particular districts, then they have less influence on elections outside of those districts. Minority voters are therefore often "packed" into majority-minority districts, where there may be far more minority voters than necessary for them to win elections, and "cracked" between other districts, in which their population is spread too thin to have significant political influence.¹⁵³ As a result, while the VRA arguably enhances the ability of racial minorities to control the outcome of some elections, this advantage comes at the expense of their ability to influence the outcome of even more elections.¹⁵⁴ This fact has not been lost on state legislatures, which for centuries have deployed this "packing" and "cracking" strategy to enact racial gerrymanders.¹⁵⁵ After *Gingles* was decided, state legislatures could plausibly argue that this strategy was not just permissible, but actually required by the VRA.¹⁵⁶ The Act therefore provided a pretext for states to engage in intentional racial gerrymandering.

In the 1990s, following *Gingles*, the Court's racial gerrymandering jurisprudence expressed hostility toward district maps ostensibly designed to help racial minorities.¹⁵⁷ Even if those maps were well-intentioned, the Court argued, the legislature's consideration of race was itself sufficiently harmful that it needed to be confined to situations in which it was truly necessary.¹⁵⁸ Recently, however, the Court has spent less time policing excessive race-consciousness, and more time combatting invidious discrimination. Racial gerrymanders invalidated in recent years had packed far more voters than the VRA requires into majority-minority districts, thereby significantly reducing the influence of racial minorities on elections elsewhere in the state.¹⁵⁹ Legislatures have attempted to justify their

¹⁵² See Adam B. Cox & Richard T. Holden, *Reconsidering Racial and Partisan Gerrymandering*, 78 U. CHI. L. REV. 553, 559 (2011).

¹⁵³ *Id.* at 557–64 (describing "packing" and "cracking" as a gerrymandering strategy, although disputing that this is the optimal strategy for partisan gerrymanders).

¹⁵⁴ *Id.*

¹⁵⁵ See David Lublin & D. Stephen Voss, *Racial Redistricting and Realignment in Southern State Legislatures*, 44 AM. J. POL. SCI. 792, 792 (2000).

¹⁵⁶ See Dale E. Ho, *Something Old, Something New, or Something Really Old? Second Generation Racial Gerrymandering Litigation as Intentional Racial Discrimination Cases*, 59 WM. & MARY L. REV. 1887, 1911–1918 (2018) (suggesting that, in certain cases where states claimed that packing minorities into particular districts was necessary for Voting Rights Act compliance, the states may have actually been intending to discriminate invidiously on the basis of race).

¹⁵⁷ See *id.* at 1893–1903; *Shaw v. Reno*, 509 U.S. 630, 651–52 (1993).

¹⁵⁸ *Shaw*, 509 U.S. at 651–52.

¹⁵⁹ See, e.g., *Ala. Legis. Black Caucus v. Alabama*, 575 U.S. 254, 259–60 (2015) (invalidating a redistricting plan that aimed to maintain the minority percentage of the population in each majority-minority district, even if this percentage was well above the majority needed to ensure that

redistricting decisions as necessary to comply with the Act.¹⁶⁰ But, by closely scrutinizing this justification, the Supreme Court has helped make sure that the VRA does not become an excuse to enact an invidious racial gerrymander.¹⁶¹

The Supreme Court's decisions in *Gingles* and *Shaw* give rise to two competing visions of minority representation. From one point of view, minority representation is best achieved by maximizing the number of districts in which election outcomes are controlled by racial minorities; in the other, by maximizing the impact of the minority vote on the overall composition of the legislature. The Court's close scrutiny of race-based redistricting, tempered by the recognition that VRA compliance may sometimes require the consideration of race, attempts to prevent either conception of minority representation from consuming the other.

C. Distinguishing Racial Gerrymandering and Partisan Gerrymandering

Courts adjudicating racial gerrymandering cases also face a second significant challenge: the strong correlation between race and political party affiliation in many states.¹⁶² Because partisan gerrymanders are permissible under the Constitution,¹⁶³ but racial gerrymanders are not,¹⁶⁴ state legislatures drawing districts on the basis of race may claim that they are actually drawing districts just to maximize partisan advantage.¹⁶⁵ But when race and political affiliation are highly correlated in a number of jurisdictions, it can be difficult for courts to tease these motivations apart.

The Supreme Court's cases in this area suggest at least two routes by which plaintiffs can demonstrate that a legislature's motive in drawing a district was racial, rather than partisan. First, plaintiffs may be able to demonstrate racial motive through statistical evidence;¹⁶⁶ however, this method of proof is challenging when race and party affiliation are closely connected.¹⁶⁷ Evidence showing that the legislature's district map disproportionately affects members of a racial group could

racial minority voters could elect the candidate of their choice); *Cooper v. Harris*, 137 S. Ct. 1455, 1469–72 (2017) (invalidating a majority-minority district drawn predominantly on the basis of race when the racial minority did not need to comprise a majority in a district to elect the candidate of its choice).

¹⁶⁰ See, e.g., *Ala. Legis. Black Caucus*, 575 U.S. at 259–60 (“Alabama believed that, to avoid retrogression under § 5 [of the Voting Rights Act], it was required to maintain roughly the same black population percentage in existing majority-minority districts); *Cooper*, 137 S. Ct. at 1468–69.

¹⁶¹ See Ho, *supra* note 156, at 1911–18.

¹⁶² See, e.g., *Cromartie II*, 523 U.S. 234, 242 (2001) (discussing the high correlation between race and political party affiliation in North Carolina).

¹⁶³ *Rucho v. Common Cause*, 139 S. Ct. 2484 (2019).

¹⁶⁴ *Shaw v. Reno*, 509 U.S. 630 (1993).

¹⁶⁵ See, e.g., *Cooper v. Harris*, 137 S. Ct. 1455, 1478–81 (2017).

¹⁶⁶ Cf. *Cromartie II*, 523 U.S. at 239 (explaining that certain statistical evidence could help show that a district's boundaries were drawn on the basis of race, although the Court found that racial motivation was not present in that case).

¹⁶⁷ *Id.* at 242 (“Caution is especially appropriate in this case, where the State has articulated a legitimate political explanation for its districting decision, and the voting population is one in which race and political affiliation are highly correlated.”).

just as easily suggest that the legislature was attempting a partisan gerrymander as it could a racial gerrymander. Both kinds of gerrymanders would likely have similar effects.¹⁶⁸ Accordingly, the Court held in *Easley v. Cromartie (Cromartie II)* that plaintiffs attempting to prove racial motivation by statistical evidence may be required to provide an alternative map that accomplishes the legislature's political goals without the same racial effects.¹⁶⁹ This alternative map can help demonstrate that the district boundaries produced by the legislature are a function of race at least as much as party.

Second, plaintiffs can prove discriminatory intent through direct evidence.¹⁷⁰ This method is more straightforward. Plaintiffs able to present direct evidence that a legislature intentionally drew a district predominantly on the basis of race need not provide an alternative map.¹⁷¹ Even if a purely partisan gerrymander might have produced the same district as a racial gerrymander, the legislature's choice to take the latter route renders the district presumptively unconstitutional.¹⁷² Indeed, the Supreme Court has held that even if the legislature considered race for the purpose of achieving a partisan result, the consideration of race still requires the resulting map to be strictly scrutinized.¹⁷³ And because partisan gerrymandering—unlike VRA compliance—is not legally required, a party's desire to win in more districts cannot provide the kind of compelling governmental interest that excuses a racial gerrymander.¹⁷⁴

Persuasive as it may be, however, direct evidence of intent can be difficult to come by. Occasionally, legislatures admit to drawing districts on the basis of race when they believe the consideration of race is justified by the need to comply with

¹⁶⁸ *Cooper v. Harris*, 137 S. Ct. 1455, 1473 (2017) (“[P]olitical and racial reasons are capable of yielding similar oddities in a district’s boundaries. That is because, of course, ‘racial identification is highly correlated with political affiliation.’”) (quoting *Cromartie*, 532 U.S. at 243).

¹⁶⁹ 532 U.S. at 258 (“In a case such as this one where majority-minority districts (or the approximate equivalent) are at issue and where racial identification correlates highly with political affiliation, the party attacking the legislatively drawn boundaries must show at the least that the legislature could have achieved its legitimate political objectives in alternative ways that are comparably consistent with traditional districting principles.”).

¹⁷⁰ See *Cooper*, 137 S. Ct. at 1479 (holding that “‘substantial direct evidence of the legislature’s racial motives’” can prove a discriminatory motive) (quoting *Bush v. Vera*, 517 U.S. 952, 960 (1996)).

¹⁷¹ *Id.* at 1480–81 (explaining that there is no “alternative map requirement” when plaintiffs present strong direct evidence that a district’s boundaries were drawn predominantly on the basis of race).

¹⁷² *Id.*

¹⁷³ *Id.* at 1473 n.7 (“[I]f legislators use race as their predominant districting criterion with the end goal of advancing their partisan interests—perhaps thinking that a proposed district is more ‘sellable’ as a race-based VRA compliance measure than as a political gerrymander and will accomplish much the same thing—their action still triggers strict scrutiny.”).

¹⁷⁴ See *Ariz. State Legis. v. Ariz. Indep. Redistricting Comm’n*, 135 S. Ct. 2652, 2658 (2015) (“‘[P]artisan gerrymanders,’ this Court has recognized, ‘[are incompatible] with democratic principles.’” (quoting *Vieth v. Jubelirer*, 541 U.S. 267, 292 (2004) (plurality opinion) (alteration in original)); *id.* at 316 (Kennedy, J., concurring in the judgment)).

the VRA.¹⁷⁵ But if legislatures are not willing to stipulate that race played a role in their decision-making, they may be able to suppress any direct evidence of the factors that went into their redistricting process.¹⁷⁶ Accordingly, statistical methods of proof may be the only methods reasonably available to plaintiffs.

* * *

Courts adjudicating racial gerrymandering claims face two major challenges. First, they must assess whether a legislature has excessively considered race when drawing a district map, to a greater extent than the VRA requires. Second, they must distinguish between partisan gerrymanders (which are permissible) and racial ones (which are not). The next Part will explain how simulated redistricting provides a useful analytical tool to address both problems.

III. SIMULATED REDISTRICTING AND RACIAL GERRYMANDERING

To some extent, racial gerrymandering presents many of the same challenges as partisan gerrymandering. First, courts need a legal standard to distinguish an unconstitutional gerrymander from a permissible district map.¹⁷⁷ Second, courts need a way to determine whether impermissible considerations are responsible for the districts' final shape.¹⁷⁸ The first question is one of definition: what can a legislature do or not do when drawing a district map? The second is one of proof: how can a court tell what the legislature actually did?

In *Rucho*, the Court rejected simulated redistricting as a way of identifying partisan gerrymanders because simulated redistricting addressed the second question, while the Court needed an answer to the first.¹⁷⁹ This problem does not present an obstacle, however, to the use of simulated redistricting to detect racial gerrymanders. The Court has already decided on a test to determine how much racial gerrymandering is too much: when racial considerations predominate over neutral districting criteria.¹⁸⁰

Racial gerrymandering and partisan gerrymandering are not completely identical problems. But simulated redistricting is adaptable enough to compensate for any differences.¹⁸¹ Additionally, simulated redistricting algorithms are already

¹⁷⁵ See, e.g., *Ala. Legis. Black Caucus v. Alabama*, 135 S. Ct. 1257 (2015).

¹⁷⁶ See Mark Tyson, *Monitored Disclosure: A Way to Avoid Legislative Supremacy in Redistricting Litigation*, 87 WASH. L. REV. 1295 (2012) (discussing the risk that Congress could use the Constitution's Speech and Debate Clause to frustrate discovery of evidence that might show that a district was drawn with a racially discriminatory purpose).

¹⁷⁷ See *Vieth v. Jubelirer*, 541 U.S. 267, 277–81 (2004) (arguing that partisan gerrymandering claims can only be adjudicated if there is a judicially manageable definition of partisan gerrymandering).

¹⁷⁸ See *Cooper*, 137 S. Ct. at 1478–80 (explaining various ways in which a plaintiff can show what considerations predominated in a legislature's redistricting process).

¹⁷⁹ *Rucho v. Common Cause*, 139 S. Ct. 2484, 2505–06 (2019).

¹⁸⁰ *Cromartie II*, 532 U.S. 234, 241 (2001).

¹⁸¹ See Wendy K. Tam Cho & Yan. Y Liu, *Toward a Talismanic Redistricting Tool: A Computational Method for Identifying Extreme Redistricting Plans*, 15 ELECTION L.J. 351, 364

designed to accommodate many of the justifications that legislatures may legitimately assert to justify consideration of race—including compliance with the VRA.¹⁸² Simulated redistricting algorithms can therefore provide a powerful tool to help courts detect racial gerrymanders.

A. *Simulated Redistricting Algorithms Can Identify Intentional Racial Gerrymanders*

Because simulated redistricting algorithms were originally developed to detect partisan gerrymanders,¹⁸³ they require slight modification to identify racial gerrymanders. Two distinctions between partisan and racial gerrymandering are worth noting. First, whereas partisan gerrymandering challenges often object to the overall partisan bias of a state’s district map, racial gerrymandering challenges focus on the considerations that went into the drawing of particular districts.¹⁸⁴ Second, metrics developed to determine the partisan *effect* of a map may be less helpful for demonstrating the racial *intentions* behind a map.¹⁸⁵ This Part explains how simulated redistricting algorithms can be easily modified to accommodate these differences.

1. Simulated Redistricting Can Be Adapted to Single-District Litigation

Partisan gerrymandering challenges focused primarily on the dilution of the vote on the statewide level.¹⁸⁶ Simulated redistricting was therefore originally designed to show that the overall partisan lean of a state’s map did not match the overall partisan lean of maps drawn according to neutral criteria.¹⁸⁷ But racial gerrymandering challenges focus on the drawing of the particular districts being challenged.¹⁸⁸ The question in a *Shaw*-type racial gerrymandering case is not whether the legislature has drawn a map that dilutes the vote of a racial minority¹⁸⁹—such a claim would be more effectively brought under § 2 of the

(2016) (“[W]hile our tool can be used to examine racial gerrymandering as well, that is the subject of separate but related research.”).

¹⁸² Liu et al., *supra* note 14, at 80–81 (explaining how PEAR can optimize district maps according to a number of objectives, including number of majority-minority districts); Herschlag et al., *supra* note 77, at 1 (explaining that all algorithmically generated district plans can be made to have the same number of majority-minority districts).

¹⁸³ Cho & Liu, *supra* note 181, at 364 (“Drawing maps in this way allows us to separate how the population patterns in the state constrain the map making and how the partisan motivations might alter the creation of maps.”).

¹⁸⁴ See Gill v. Whitford, 138 S. Ct. 1916, 1929–31 (2018).

¹⁸⁵ See Cho & Liu, *supra* note 181, at 353–54 (mentioning several measures of partisan bias).

¹⁸⁶ Gill, 138 S. Ct. at 1929.

¹⁸⁷ Cain et al., *supra* note 54, at 1538.

¹⁸⁸ United States v. Hays, 515 U.S. 737, 744–45 (1995) (“Where a plaintiff resides in a racially gerrymandered district, however, the plaintiff has been denied equal treatment because of the legislature’s reliance on racial criteria.”).

¹⁸⁹ Shaw v. Reno, 509 U.S. 630, 650 (1993).

VRA.¹⁹⁰ Instead, a plaintiff must show that the boundaries of a particular district were drawn with race in mind.¹⁹¹

Fortunately, simulated redistricting algorithms are sufficiently flexible to accommodate gerrymandering claims focused on individual districts. Simulated redistricting algorithms, while originally designed with the freedom to mutate district boundaries at will, can be adjusted to limit such changes to the borders of a single district and those adjacent to it.¹⁹² As a result, the algorithm can be made to generate maps that modify only the boundaries of the single challenged district. Of course, this constraint may be too restrictive, as changes to a single district may ripple out, requiring the modification of non-adjacent district boundaries as well.¹⁹³ But in that case, the simulated redistricting algorithm can operate in its original form, in which it is able to consider (and redraw) all districts at once.

2. Simulated Redistricting Can Unmask Discriminatory Intent

Simulated districting enables comparison between a legislature's map and maps generated automatically pursuant to neutral criteria. But the question still remains: on what basis should those maps be compared?¹⁹⁴ In the partisan gerrymandering context, experts developed a number of metrics of a map's partisan bias.¹⁹⁵ But these metrics are not necessarily suitable to intentional racial gerrymandering claims, which focus more on the *motivation* behind a district map than the *effect* of the manipulation that produced that map.¹⁹⁶ Measurements of a map's partisan

¹⁹⁰ Cf. *Thornburg v. Gingles*, 478 U.S. 30, 50–52 (1986) (describing the test for vote dilution claims).

¹⁹¹ *Hays*, 515 U.S. at 744–47.

¹⁹² Liu et al., *supra* note 14, at 80 (describing the problem of simulated redistricting as generating acceptable partitions of different geographical subunits into different districts, all contained in a fixed region). In other words, if the boundaries of only a single district are being challenged, then the redistricting algorithm can be configured to treat just that district and any surrounding districts as the entire jurisdiction whose map is being redrawn.

¹⁹³ See *Ala. Legis. Black Caucus v. Alabama*, 575 U.S. 254, 266 (2015) (finding relevant evidence introduced “to prove that the use of race to draw the boundaries of the majority-minority districts affected the boundaries of other districts as well.”).

¹⁹⁴ See Cho & Liu, *supra* note 181, at 354–55.

¹⁹⁵ *Id.*

¹⁹⁶ See *Miller v. Johnson*, 515 U.S. 900, 916 (1995). The efficiency gap, for example, is a measure that determines which party's candidates receive more “wasted” votes throughout an entire state. Stephanopoulos & McGee, *supra* note 6. Partisan gerrymanders have also been challenged by measuring the number of districts won by a certain party in the legislature's map, and comparing that to the number of districts that would have been won by a certain party in a neutrally drawn map. See *supra* Part I.C. Neither of these metrics could be applied directly to racial gerrymanders. First, it is unclear what it would mean to say that a candidate or a district belongs to a certain race, whereas it is clear what it means for a candidate or a district to belong to a certain party. And second, the Supreme Court has expressly said that racial gerrymanders do not need to “dilute[] a racial group's voting strength” to violate the Constitution. *Shaw v. Reno*, 509 U.S. 630, 650 (1993). In the Court's view, the fact that lines are drawn on the basis of race inflicts an injury *per se*. *Id.*

effects may therefore seem irrelevant to a judicial test that focuses on race, not party, and on intent, not effects.¹⁹⁷

However, the Supreme Court's intentional gerrymandering cases suggest other ways to compare automatically generated maps to the legislature's map—methods that can help determine the legislature's intent. In racial gerrymandering challenges, plaintiffs often point to specific features of a district plan that they allege arose out of the legislature's consideration of race.¹⁹⁸ Courts can evaluate such arguments by examining whether the same alleged indicia of racial motive appear in neutrally drawn, algorithmically generated maps. For example, plaintiffs often allege that a state legislature considered race in the redistricting process in order to “pack” a high number of minority voters into a particular district, so that the remainder could be “cracked” between districts in which they would have little political influence.¹⁹⁹ To determine whether race motivated the shape of the district boundaries, a court may examine whether maps automatically generated pursuant to neutral criteria result in a district with a minority voting population as high as that in the challenged district.²⁰⁰ In other cases, plaintiffs may allege that a district was drawn with a bizarre, non-compact shape.²⁰¹ Automatically generated maps could then be compared to the legislature's map according to some metric quantifying the challenged district's compactness.²⁰² If race would explain the district's boundaries, but the legislature's neutral redistricting criteria (as reflected in the algorithmically-generated maps) do not produce a similarly spread-out

¹⁹⁷ See Cho & Liu, *supra* note 181, at 364 (“[W]hile our tool can be used to examine racial gerrymandering as well, that is the subject of separate but related research.”).

¹⁹⁸ See, e.g., *Cromartie II*, 532 U.S. 234, 243 (2001) (discussing whether the challenged district's “shape, its splitting of towns and counties, and its high African-American voting population” demonstrate racial motive); *Cooper v. Harris*, 137 S. Ct. 1455, 1477 (2017) (finding that the drawing of district boundaries around a specific black community, as well as the district's overall black voting-age population, evinced the legislature's consideration of race).

¹⁹⁹ See Ho, *supra* note 156, at 1914 (suggesting that state legislatures may “seek[] to dilute the influence of minority voters by overpacking them into as few districts as possible.”). Although overpacking a minority group into a single district can dilute its influence on elections outside that district, this result cannot be challenged under the VRA, which the Supreme Court has not read to require state legislatures to preserve minority influence in “crossover” districts. *Bartlett v. Strickland*, 556 U.S. 1 (2009). However, *intentional* overpacking designed to reduce the number of crossover districts may still offend the Constitution. *Id.* at 23 (“Our holding that § 2 [of the VRA] does not require crossover districts does not consider the permissibility of such districts as a matter of legislative choice or discretion.”) (plurality opinion).

²⁰⁰ Cf. Cain et al., *supra* note 54, at 1533–37 (explaining that a comparison between automatically generated maps and the legislature's district map can isolate the effects of a state's natural political geography to demonstrate for which effects the legislature bears responsibility).

²⁰¹ See *Shaw v. Reno*, 509 U.S. 630, 644 (1993) (“Appellants contend that redistricting legislation that is so bizarre on its face that it is ‘unexplainable on grounds other than race,’ . . . demands the same close scrutiny that we give other state laws that classify citizens by race. Our voting rights precedents support that conclusion.”).

²⁰² See Cain et al., *supra* note 54, at 1533–37.

district, then this can provide powerful evidence suggesting that the district was drawn predominantly on the basis of race.²⁰³

Ultimately, the relevant measure of racial bias will be determined by the legislature's alleged goals. Plaintiffs bringing an intentional racial gerrymandering suit do not need to show that challenged map results in some electoral harm²⁰⁴—they just need to show that certain populations were included or excluded from a district predominantly because of their race.²⁰⁵ Plaintiffs can therefore demonstrate this impact by using simulated redistricting to see whether districts drawn without the consideration of race include or exclude the same racial groups.²⁰⁶ Map comparison may therefore be an easier exercise in the racial gerrymandering context than in the partisan gerrymandering context. Litigants do not face the problem of providing a universal definition of fairness against which a map can be compared.²⁰⁷ Any indicium demonstrating the legislature's predominant consideration of race will do.

Of course, if the Constitution only prohibits districts drawn *predominantly* on the basis of race, then some lesser amount of racial consideration may be permissible. Indeed, the Supreme Court has explained that, for strict scrutiny to apply, “[r]ace must not simply have been a motivation for the drawing of a majority-minority district, but the predominant factor motivating the legislature's districting decision.”²⁰⁸ Accordingly, algorithmically generated maps that were drawn without any consideration of race may not provide a representative sample of the set of legally permissible maps. In other words, if the legislature can consider race (up to a certain point), then an algorithm designed to check the legislature's work should be able to consider race (up to a certain point) as well.

To some extent, redistricting algorithms already take race into account, because the algorithms need to consider race to ensure that the generated maps contain the minimum number of majority-minority districts required by the VRA.²⁰⁹ It is unclear whether a legislature could permissibly consider race for a purpose other than VRA compliance—indeed, the Supreme Court has yet to decide definitively

²⁰³ See *Bethune-Hill v. Va. State Bd. of Elections*, 137 S. Ct. 788, 799 (2017) (“As a practical matter, in many cases, perhaps most cases, challengers will be unable to prove an unconstitutional racial gerrymander without evidence that the enacted plan conflicts with traditional redistricting criteria.”).

²⁰⁴ *Shaw*, 309 U.S. at 650.

²⁰⁵ *Miller v. Johnson*, 515 U.S. 900, 916 (1995).

²⁰⁶ See *Cain et al.*, *supra* note 56, at 1539 (arguing that simulated redistricting can help determine a legislature's intent in drawing district lines); *Miller*, 515 U.S. at 916 (“The plaintiff's burden is to show . . . that race was the predominant factor motivating the legislature's decision to place a significant number of voters within or without a particular district.”).

²⁰⁷ *Cf. Rucho v. Common Cause*, 139 S. Ct. 2454, 2505–06 (2019).

²⁰⁸ *Cromartie II*, 532 U.S. 234, 241 (2001) (internal quotations and citations omitted).

²⁰⁹ See, e.g., *Herschlag et al.*, *supra* note 79, at 8. See also *infra* Part III.B.2, discussing VRA compliance in the context of simulated redistricting.

that VRA compliance is itself a legitimate reason to consider race in redistricting.²¹⁰ However, if there is another permissible reason to consider race, then the algorithms could be adapted to prioritize that purpose as well.²¹¹ The operator of the algorithm would then instruct it to give enough weight to the permissible racial consideration such that the generated maps are representative, but not so much that the racial considerations predominate.²¹²

B. Simulated Redistricting Can Overcome Defenses to Racial Gerrymandering Claims

Plaintiffs bringing racial gerrymandering challenges will often be required to overcome two common defenses. First, states may assert that their motives were in fact political rather than racial, and that any racial imbalance in the district map is simply the result of the strong correlation between race and political affiliation.²¹³ Second, legislatures sometimes admit to considering race, but insist that doing so was necessary to ensure that the state did not violate the VRA.²¹⁴ Fortunately, simulated redistricting algorithms can be employed to address both arguments.

1. Simulated Redistricting Algorithms Can Separate Political and Racial Motives

To find that racial considerations predominated in the districting process, a court must necessarily also find that legitimate, non-racial considerations would not have led the legislature to make the same decisions.²¹⁵ However, this can be challenging in states where race and party affiliation are highly correlated; in such circumstances, racial considerations and partisan considerations can lead to the same result.²¹⁶ Indeed, a map-maker might even use racial data in an attempt to enact a partisan gerrymander.²¹⁷ Plaintiffs challenging a district as a racial gerrymander may sometimes be able to bring direct evidence, such as statements by legislators, that racial considerations predominated.²¹⁸ But such evidence may

²¹⁰ *Bethune-Hill*, 137 S. Ct. at 801 (“As in previous cases, therefore, the Court assumes, without deciding, that the State’s interest in complying with the Voting Rights Act was compelling.”).

²¹¹ See Liu et al., *supra* note 14, at 81 (describing the optimization function that the PEAR algorithm uses to weight different legislative priorities when drawing districts).

²¹² See *id.*

²¹³ See, e.g., *Cromartie II*, 532 U.S. at 239.

²¹⁴ See Richard L. Hasen, *Race or Party, Race as Party, or Party All the Time: Three Uneasy Approaches to Conjoined Polarization in Redistricting and Voting Cases*, 59 WM. & MARY L. REV. 1837, 1850 (2018) (“Republican legislators defended their redistricting maps by arguing either that they had to pack more minority voters in these districts to comply with sections 2 or 5 of the Voting Rights Act, or that they were acting to help their party, not on the basis of race.”).

²¹⁵ *Cromartie II*, 532 U.S. at 242–43.

²¹⁶ *Cooper v. Harris*, 137 S. Ct. 1455, 1473 (2017).

²¹⁷ *Id.* at 1473 n.7 (explaining that this practice would create an unconstitutional racial gerrymander).

²¹⁸ *Id.* at 1479.

not always be available.²¹⁹ Accordingly, plaintiffs frequently have to demonstrate predominant racial intent with statistical and empirical methods, rather than direct evidence.

Simulated redistricting has the potential to make this task much easier. The Court in *Cromartie II* suggested that, for plaintiffs to prove that racial rather than political considerations motivated the shape of a district, they must provide an alternative district map that “satisfie[s] the legislature’s other nonracial political goals as well as traditional nonracial districting principles.”²²⁰ Simulated redistricting algorithms are remarkably well-suited to this task as they are capable of generating thousands of maps that meet traditional districting principles.²²¹ If a legislature seeks to maximize partisan advantage, then the algorithms can be configured to ensure that the maps contain as many Republican districts or Democratic districts as possible. Alternatively, if the legislature instead seeks to maximize the incumbent advantage, then the algorithm’s optimization function could be redesigned to prioritize “safe” districts. In either case, the algorithm would do its best to generate maps that conform to the legislature’s political—but non-racial—goals.

If even a single one of these maps accomplishes the legislature’s political goals without indicia of alleged racial considerations, then *Cromartie II*’s alternative map requirement has been satisfied.²²² However, a single alternative map may be too thin a reed on which to hang the plaintiff’s entire racial gerrymandering claim. If, out of thousands of automatically generated maps, only a few accomplish the legislature’s stated goals without indicia of racial bias, these results would more likely defeat plaintiffs’ claim than assist it. In other words, a large percentage of race-neutral, algorithmically drawn maps resembling the map the legislature produced would suggest that the legislature likely did not need to consider race to arrive at the shape of the challenged district.²²³ Accordingly, when plaintiffs use simulated redistricting algorithms to attack racial gerrymanders in jurisdictions with racially polarized voting, the courts may well focus not on the presence or absence of a *single* alternative map, but on the *preponderance* of alternative maps. The ultimate question, after all, is not whether the legislature might *theoretically* have accomplished its political goals without the same racial effects, but whether those effects most likely resulted from the consideration of race.²²⁴

²¹⁹ See Tyson, *supra* note 179.

²²⁰ 532 U.S. at 249.

²²¹ Cain et al., *supra* note 56, at 1537; see also *Common Cause v. Rucho*, 279 F. Supp. 3d 587, 646 (M.D.N.C. 2018) (discussing “3,000 simulated districts[sic] plans” generated algorithmically).

²²² See 532 U.S. at 249.

²²³ Cf. Cain et al., *supra* note 56, at 1533–37 (explaining how simulated redistricting algorithm isolates the effects of inputs to the algorithm, like the state’s geography, and alternate considerations).

²²⁴ See *Shaw v. Reno*, 509 U.S. 630, 650 (1993) (explaining that racial gerrymanders need not dilute the minority vote to be unconstitutional); *Cromartie II*, 532 U.S. at 257 (finding that plaintiffs had “not successfully shown that race, rather than politics, predominantly accounts for” the state’s map).

Of course, if race and politics are perfectly or nearly-perfectly correlated, then there may genuinely be no difference between a district map produced by a political gerrymander and one produced by a racial gerrymander.²²⁵ In that situation, plaintiffs may need to rely on direct evidence to prove an intentional racial gerrymander.²²⁶ However, where race and political affiliation are not necessarily identical, simulated redistricting can provide a helpful tool to disentangle racial and political motives.

2. Simulated Redistricting Algorithms Control for Voting Rights Act Compliance

Simulated redistricting can help a court determine whether a legislature considered race when drawing a district map. But frequently, legislatures openly admit to considering race, arguing that the consideration of race was necessary to avoid a VRA violation.²²⁷ Even when this justification is proffered, the legislature's map is still subject to strict scrutiny, as race was (admittedly) the predominant consideration in the districting process.²²⁸ But if the legislature had a "strong basis in evidence" to believe that considering race was necessary to comply with the VRA, then no constitutional violation has occurred.²²⁹

When used to detect a partisan gerrymander, simulated redistricting algorithms are constrained to produce complete district maps featuring the same number of majority-minority districts as the legislature's map, in order to isolate the partisan effects caused by the legislature's redistricting choices.²³⁰ But in the context of VRA compliance, that constraint is removed,²³¹ and the simulated redistricting algorithms are thus free to produce different numbers of majority-minority districts. If most of these maps—drawn pursuant to race-neutral criteria—produced the required number of majority-minority districts, then this result would suggest that the legislature need not have considered race:²³² consideration of race-neutral criteria alone would have produced a district map compatible with the requirements of the VRA.

Of course, frequently the issue before the court is not whether the legislature needed to consider race in order to produce a particular district, but rather whether

²²⁵ *Cooper v. Harris*, 137 S. Ct. 1455, 1473 (2017).

²²⁶ *See id.* at 1479.

²²⁷ *See, e.g., Ala. Legis. Black Caucus v. Alabama*, 575 U.S. 254, 259–60 (2015).

²²⁸ *Cooper*, 137 S. Ct. at 1469.

²²⁹ *Id.* at 1464.

²³⁰ Herschlag et al., *supra* note 79, at 1.

²³¹ *See id.* at 8 (discussing the majority-minority district constraint).

²³² *Cf. Cain et al., supra* note 56, at 1529–37 (explaining how simulated redistricting can isolate the natural results of a state's population distribution from the deliberate considerations of the legislature). *See also Gonzalez v. City of Aurora*, 535 F.3d 594, 599–600 (7th Cir. 2008) (recommending the use of simulated redistricting to determine when racial considerations, rather than natural voter distribution, leads to racial vote dilution).

the creation of that district was required by the VRA in the first instance.²³³ Legislatures have often drawn majority-minority districts, not because the VRA actually required them, but because the legislature either misunderstood the requirements of the VRA or used it as a pretext to pack minority voters into as few districts as possible.²³⁴ When legislatures admit to the consideration of race on the basis of a flawed understanding of the VRA, simulated redistricting algorithms are unnecessary. The courts simply need to correct the misunderstanding.

C. Simulated Redistricting Can Still Be Useful After *Rucho*

Simulated redistricting algorithms present a promising tool for the identification of racial gerrymanders. But then again, simulated redistricting appeared to offer a workable approach to partisan gerrymandering as well.²³⁵ Yet the Supreme Court in *Rucho* declined to consider evidence produced by these algorithms to identify a partisan gerrymander.²³⁶ Still, *Rucho* does not suggest that simulated redistricting algorithms would be similarly ignored in racial gerrymandering cases. Indeed, the Court in *Rucho* took pains to clarify that its holding did not affect the law of racial gerrymanders.²³⁷ This distinction is key: neither of the concerns that caused the Court to reject simulated redistricting in the partisan gerrymandering context apply in the racial gerrymandering context.

First, the Court in *Rucho* rejected simulated redistricting because, though an algorithm could be used to measure the degree of partisan bias in a map, it promised no way for the Court to determine at what point that bias became unconstitutional.²³⁸ In the racial gerrymandering context, however, the Court has already determined how much consideration of race is too much. Specifically, a district map offends the Constitution when the boundaries of a district were drawn “predominant[ly]” on the basis of race.²³⁹

Of course, “predominance” is not itself a mathematically precise threshold. And though simulated redistricting algorithms may be able to help determine the legislature’s intent when drawing a district, without a more precise definition of predominance, they cannot themselves tell a court when a particular consideration has predominated. But imprecision of the “predominance” test has not stopped courts from considering statistical evidence to prove a legislature’s motivation in

²³³ See, e.g., *Cooper*, 137 S. Ct. at 1469–72 (the Voting Rights Act does not require a majority-minority district when there is “crossover” voting from the racial majority); *Ala. Legis. Black Caucus v. Alabama*, 575 U.S. 254, 275–76 (2015) (the Voting Rights Act does not require states to hold the minority percentage of a district constant between redistricting cycles); *Bartlett v. Strickland*, 556 U.S. 1, 23 (2009) (the Voting Rights Act does not require the creation of “crossover” districts).

²³⁴ *Cooper*, 137 S. Ct. at 1480 n.15 (discussing the reasons why state legislatures might engage in a racial gerrymander).

²³⁵ See, e.g., Cain et al., *supra* note 54; Cho & Liu, *supra* note 181.

²³⁶ *Rucho v. Common Cause*, 139 S. Ct. 2484, 2505–06 (2019).

²³⁷ *Id.* at 2496–97 (distinguishing between partisan and racial gerrymanders).

²³⁸ *Id.* at 2505.

²³⁹ *Miller v. Johnson*, 515 U.S. 900, 916 (1995).

racial gerrymandering cases.²⁴⁰ Simulated redistricting just presents another potentially highly probative form of statistical evidence.

Second, the Court in *Rucho* objected that simulated redistricting did not provide a uniform baseline against which to measure a map's partisan bias.²⁴¹ Instead, because the algorithms are constrained by the legislature's neutral redistricting criteria, any measurement of partisan bias would vary based on "what the mapmakers said they set out to do."²⁴² This objection may have some force in the partisan gerrymandering context, in which the primary challenge for the courts was finding an accurate and universal measure of a map's partisan effects.²⁴³ But in the racial gerrymandering context, the effects of the map are largely beside the point—what matters constitutionally is the mapmaker's intent.²⁴⁴ The key constitutional factor in racial gerrymandering cases is the extent to which the legislature considered race.²⁴⁵ And when investigating the potentially hidden motivations behind any legislative act, courts frequently compare a legislature's stated motives with the legislation actually produced.²⁴⁶ Simulated redistricting sharpens this inquiry by providing a representative sample of neutrally drawn maps with which to make the comparison.²⁴⁷ The relevant "neutral baseline" is therefore not some platonic ideal of a district map. It is simply the map the legislature would have produced had it not impermissibly considered race.²⁴⁸ When determining legislative intent, what the legislators "set out to do" is not a distraction—it's the whole point.

Ultimately, the Court in *Rucho* did not reject simulated redistricting because of any technical deficiency in the algorithms. The Court's problem with partisan gerrymandering was one of definition, not one of proof. Political scientists had provided the Court with an abundance of metrics and statistical techniques by which a map's partisan bias could be measured; but it was still up to the Court to

²⁴⁰ See, e.g., *Cooper v. Harris*, 137 S. Ct. 1455, 1477–78 (2017).

²⁴¹ *Rucho*, 139 S. Ct. at 2505.

²⁴² *Id.*

²⁴³ See Stephanopoulos & McGhee, *supra* note 6, at 886 (framing the question as "how much political . . . effect is too much?") (quoting *Vieth v. Jubelirer*, 541 U.S. 267, 296 (2004) (plurality opinion)).

²⁴⁴ See *Shaw v. Reno*, 509 U.S. 630, 650 (1993).

²⁴⁵ *Cromartie II*, 523 U.S. 234, 241–42 (2004).

²⁴⁶ See, e.g., *Village of Arlington Heights v. Metro. Hous. Dev. Corp.*, 429 U.S. 252, 266–68 (1977) (holding that hidden discriminatory motive might be revealed by looking to a law's discriminatory impact, as well as testimony regarding the purpose of the law); *City of Cleburne v. Cleburne Living Cent.*, 473 U.S. 432, 449–50 (1985) (finding that a municipal decision was motivated by "irrational prejudice" toward the mentally disabled, rather than any public health benefit); *Romer v. Evans*, 517 U.S. 620, 634–35 (1996) (finding that a state constitutional amendment was likely motivated by animus toward gays and lesbians, rather than a desire to protect freedom of association).

²⁴⁷ See *supra* Part I.B.

²⁴⁸ See *Cromartie II*, 532 U.S. at 249 (explaining that a legislature can accomplish its districting goals through a map that results in significant racial effects, so long as those effects are not intentional).

decide how much partisan bias was too much.²⁴⁹ In the partisan gerrymandering context, the Court declared this question unanswerable.²⁵⁰ But the Court long ago developed the “predominant [motivating] factor” standard used to identify racial gerrymanders.²⁵¹ Simulated redistricting algorithms therefore need not decide how much bias is too much; instead, they simply need to measure the probability that racial considerations played a role in the redistricting process. This is a task that an algorithm can perform.

IV. CONCLUSION

Pretextual redistricting has become more common since state legislatures have realized that they can abuse the VRA to harm minority voters.²⁵² And it may become even more common yet, now that the Supreme Court has given its imprimatur to partisan gerrymanders,²⁵³ often nearly indistinguishable from racial gerrymanders.²⁵⁴ Racial gerrymandering cases present an abundance of thorny legal questions regarding the extent to which legislatures can consider race when drawing election district boundaries. But when intentional racial gerrymanders arise—not out of a good faith effort to comply with the VRA or enhance minority representation, but from an attempt to suppress the minority vote—courts face a practical problem as well: legislatures are wary of admitting their invidiously discriminatory motive. Accordingly, courts need a way to distinguish necessary and lawful consideration of race (or race-correlated factors) from unlawful discrimination.

Simulated redistricting algorithms offer help with this narrow but crucial task. Although originally developed to provide a more objective measurement of a map’s partisan bias, simulated redistricting provides a generalizable technique for isolating and identifying the considerations that entered into a legislature’s redistricting process.²⁵⁵ A comparison between a legislature’s map and maps generated algorithmically pursuant to neutral criteria can therefore provide powerful evidence that the legislature considered a factor—such as race—that it claims to have ignored.

Of course, the theoretical appeal of simulated redistricting does not guarantee the practicality of its application. More empirical research will be necessary to verify that simulated redistricting algorithms are actually capable of isolating racial

²⁴⁹ See Cain et al., *supra* note 54, at 1525–26 (mentioning several measures of partisan fairness).

²⁵⁰ *Rucho v. Common Cause*, 139 S. Ct. 2484, 2506 (2019).

²⁵¹ See *Miller v. Johnson*, 515 U.S. 900, 916 (1995).

²⁵² See Ho, *supra* note 156, at 1911–18 (characterizing recent racial gerrymandering cases as intentional attempts to harm minority voters).

²⁵³ *Rucho*, 139 S. Ct. at 2506 (holding that partisan gerrymandering challenges present a nonjusticiable political question).

²⁵⁴ *Cooper v. Harris*, 137 S. Ct. 1455, 1473 (2017) (“[P]olitical and racial reasons are capable of yielding similar oddities in a district’s boundaries.”).

²⁵⁵ See Cain et al., *supra* note 54, at 1533–37.

motive on real-life district maps.²⁵⁶ And even if these algorithms can fulfill their purpose in practice, courts may still reject them. *Rucho* may not have foreclosed simulated redistricting in racial gerrymandering cases, but—even before *Rucho*—the judiciary has sometimes been hostile to or confused by statistical argument.²⁵⁷ Misunderstanding the algorithms, courts may still dismiss empirical evidence produced by simulated redistricting as “sociological gobbledygook.”²⁵⁸

However, even if simulated redistricting algorithms are put to good use, the problem of intentional gerrymandering will be far from solved. When legislatures draw district maps, there are necessarily winners and losers. And though courts may be able to prohibit legislatures from intentionally picking losers on the basis of race, the judiciary ultimately cannot prohibit the consideration of *every* criterion on which a legislature might gerrymander. To truly prevent representatives from choosing their voters, the redistricting process may ultimately need to be removed from legislative hands,²⁵⁹ or made irrelevant by the adoption of an election system in which redistricting is either difficult to manipulate or does not take place at all.²⁶⁰ But, as long as legislatures remain mapmakers—and as long as they continue to draw maps on the basis of race—courts will need empirical tools to help them to identify intentional racial gerrymanders.

²⁵⁶ See Cho & Liu, *supra* note 181, at 364.

²⁵⁷ See, e.g., Ryan D. Enos, Anthony Fowler & Christopher S. Havasy, *The Negative Effect Fallacy: A Case Study of Incorrect Statistical Reasoning by Federal Courts*, 14 J. EMPIRICAL LEGAL STUD. 618 (2017); Oliver Roeder, *The Supreme Court is Allergic to Math*, FIVETHIRTYEIGHT (Oct. 17, 2017, 6:00 AM), <https://fivethirtyeight.com/features/the-supreme-court-is-allergic-to-math/>.

²⁵⁸ Transcript of Oral Argument at 40, *Gill v. Whitford*, 138 S. Ct. 1916 (2018) (No. 16-1161).

²⁵⁹ See, e.g., H. R. 1, 116th Cong. § 2401 (2019) (requiring all congressional redistricting to be performed by an independent commission).

²⁶⁰ Some election systems, like a statewide party-list ballot, can take place entirely within a single large district, and therefore would not require any redistricting take place. Other election systems, like Single Transferable Vote, use multi-member districts, which are much more resistant to gerrymandering than single-member districts with plurality elections. See Kevin Reyes, *Redistricting or Rethinking? Why Proportional Representation May Be a Better Solution than California’s Independent Redistricting Commission*, 20 S. CAL. INTERDISC. L. J. 655, 682–83, 686 (2011).