Nos. 21-1086, 21-1087

IN THE
Supreme Court of the United States

JOHN H. MERRILL, *et al.*,

Appellants,

v.

EVAN MILLIGAN, *et al.*,

Appellees.

JOHN H. MERRILL, *et al.*,

Petitioners,

v.

MARCUS CASTER, *et al.*,

Respondents.

On Appeal from and Writ of Certiorari to the United States District Court for the Northern District of Alabama

BRIEF OF COMPUTATIONAL REDISTRICTING EXPERTS AS *AMICI CURIAE* IN SUPPORT OF APPELLEES AND RESPONDENTS

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INTERESTS OF *AMICI CURIAE*[1]

Amici are experts in computational redistricting who have published, testified, and consulted on districting algorithms, gerrymandering, and the Voting Rights Act (VRA). They have an interest in ensuring that courts interpret the VRA in a manner that accurately accounts for the current strengths and weaknesses of computational redistricting.

In the field of computational redistricting, **Dr. Daryl R. DeFord**, **Dr. Amariah Becker**, and **Dr. Dara Gold** have published more than a dozen peer-reviewed articles and book chapters,[2] testified in court,[3] generated maps for redistricting commissions and litigants,[4] and served as consulting experts.

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[1] All parties have consented to this filing. No party or party's counsel wholly or partly authored this brief. Only *amici* and their counsel funded its preparation and submission.

[2] *See, e.g.*, Amariah Becker, Moon Duchin, Dara Gold & Sam Hirsch, *Computational Redistricting and the Voting Rights Act*, 20 ELECTION L.J. 407 (2021); Amariah Becker & Justin Solomon, *Redistricting Algorithms*, in POLITICAL GEOMETRY: RETHINKING REDISTRICTING IN THE US WITH MATH, LAW, AND EVERYTHING IN BETWEEN 303 (Moon Duchin & Olivia Walch eds., 2022); Daryl DeFord, Moon Duchin & Justin Solomon, *Recombination: A Family of Markov Chains for Redistricting*, HARV. DATA SCI. REV., Issue 3.1, at 1 (Winter 2021); Elle Najt, Daryl DeFord & Justin Solomon, *Empirical Sampling of Connected Graph Partitions for Redistricting*, 104 PHYSICAL REV. E 64130 (2021).

[3] *See, e.g.*, *Carter v. Chapman*, 270 A.3d 444, 462–63 (Pa. 2022).

[4] *See, e.g.*, *In re Colo. Indep. Legis. Redistricting Comm'n*, 2021 CO 76, ¶ 59.

SUMMARY OF ARGUMENT

Appellants argue that a vote-dilution claim under Section 2 of the VRA, 52 U.S.C. § 10301, is "foreclose[d]" unless the plaintiffs present a sample of millions of computer-generated maps "neutrally drawn" without racial data and "show that the enacted plan produced fewer majority-minority districts" than the sample's average, or "median," map. Br. for Appellants 45, 56 ("Br."). Appellants' proposal to create this safe harbor for state districting schemes fundamentally misunderstands both the science of computational redistricting and the law governing Section 2 claims. As experts in the field of computational redistricting, *amici* write to set the record straight.

First, *amici* describe why—contrary to many laypersons' intuition—it is computationally intractable, and thus effectively impossible, to generate a complete enumeration of all potential districting plans. Perhaps also counterintuitively, various algorithms that attempt to create a manageable sample of that astronomically large universe do not consistently identify an average or median map, as would be needed for Appellants' proposed test. However, a different type of algorithm, known as an "optimization" or "exploratory" algorithm, can help search for better remedial options—but it would address only what is possible, not what is typical or average.

Second, *amici* explain that Appellants' proposal contravenes Section 2's plain text—which, as Justice Scalia explained, requires comparing a challenged map to one alternative map, not millions—and is hard to

reconcile with this Court's cases on racial gerrymandering. In lieu of Appellants' test, *amici* propose requiring plaintiffs to come forward at the liability stage with one remedial map that affords equal electoral opportunity to all citizens while avoiding excessive and unjustified consideration of race.

Third, *amici* explain why no claim or defense in a VRA case should require the use of computational redistricting. Contrary to Appellants' hope, sampling algorithms cannot reliably ascertain how many majority-minority districts "would be expected" from a race-blind districting process. Br. 45. And adopting Appellants' proposed test could decimate equal electoral opportunity across our Nation. Fortunately, however, recent technological advances in computational redistricting can now play a positive role in VRA enforcement: Optimization, or exploratory, algorithms can help generate remedial maps that make good on Section 2's promise to afford American citizens of all races an equal "opportunity … to elect representatives of their choice," 52 U.S.C. § 10301(b)—without relying excessively on race or racial data.

ARGUMENT

I. The Science of Computational Redistricting

"Redistricting is never easy …."[5] Since the dawn of the Reapportionment Revolution 60 years ago, reformers have dreamed of the day when all the

[5] *Abbott v. Perez*, 138 S. Ct. 2305, 2314 (2018).

difficulties of redistricting will be solved by computers. While that day has not yet arrived (and likely never will), in recent years significant progress has been made in the field of computational redistricting.

Computational redistricting is the use of computers to algorithmically generate redistricting plans.[6] The data inputted to the algorithm typically include the populations and geographies of areas defined by the Census Bureau, such as census blocks. Here, we describe three types of algorithms, each generating different outputs:

- An *enumeration* algorithm generates every possible way to district a given geographic area.
- A *sampling* algorithm randomly generates a large collection, or *ensemble*, of districting plans whose properties can then be compared statistically to the properties of a particular plan.
- An *optimization* (or exploratory) algorithm generates one or a handful of plans with properties deemed beneficial.

Only the third type of algorithm has useful applications in VRA cases. But none of these algorithms should be required to prove an element of a voting-rights claim or defense.

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[6] For general background, see Becker & Solomon, *supra* note 2, at 303–40.

A. The Dead End of Enumeration Algorithms

In theory, an enumeration algorithm would provide a rich body of data by identifying every possible way to divide a jurisdiction, such as a state, into the right number of districts. In practice, this is impossible. Enumeration algorithms cannot solve the problem of assigning Alabama's 185,976 census blocks (or, for that matter, its 1,837 voting precincts) to seven equally populated congressional districts. The problem is too large and hence too complex.

As the number of districts and the number of building blocks used to construct them increase, the number of distinct districting maps rises exponentially—a phenomenon known as *combinatorial explosion*. This means not only that we lack the computing power to enumerate all plans today, but that computers likely will never be able to do so.

As an illustration, imagine we want to partition an n x n square grid into n equal-sized, contiguous (*i.e.*, connected) districts. As we increase the number of districts and building blocks in the grid, the number of potential districting plans explodes:

n	Number of Plans
1	1
2	2
3	10
4	117
5	4,006
6	451,206
7	158,753,814
8	187,497,290,034
9	706,152,947,468,301

A 9 x 9 square grid contains only 81 building blocks. But Alabama has 185,976 census blocks. Mathematicians have not yet discovered a way to reasonably estimate—much less precisely calculate—how many ways 185,976 census blocks can be arranged into seven contiguous, roughly equally populated districts.[7] And just as the number of feasible maps cannot be ascertained, the full set of such maps cannot be enumerated (or stored).

Importantly, this computational intractability means that mathematicians simply cannot answer questions like, "What percentage of the complete enumeration of maps contains two majority-Black districts?" At the scale dictated by real-world redistricting problems, enumeration algorithms are a dead end.

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[7] For a case far simpler than Alabama's: The number of ways to build four congressional districts from Iowa's 99 counties is estimated to be about 10^{24}, roughly a trillion trillions. *See* Benjamin Fifield, Kosuke Imai, Jun Kawahara & Christopher T. Kenny, *The Essential Role of Empirical Validation in Legislative Redistricting Simulations*, 7 STAT. & PUB. POL'Y 52, 64 (2020).

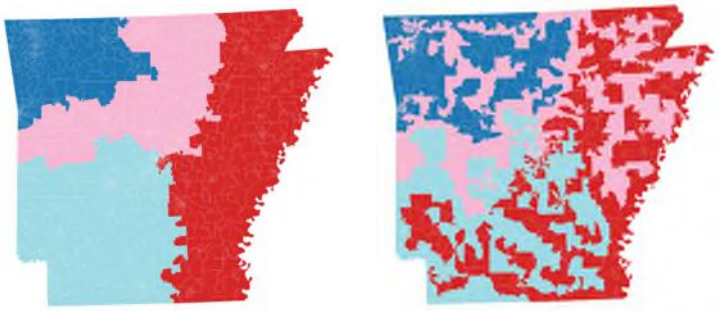
B. Sampling Algorithms and Their Limitations

Because no enumeration algorithm can generate the complete universe of plausible districting plans, the next question is whether a sampling algorithm can generate a smaller collection, or *ensemble*, that is truly representative of the universe. If so, the properties of the ensemble's plans and districts would closely track the properties of the full universe of plans and districts. And those properties could then be meaningfully compared to the properties of a particular proposed or enacted plan and its districts. This process, while valuable in certain contexts, has significant technical and theoretical limitations that must not be ignored.

As an initial matter, we would want to eliminate maps that violate "one person, one vote" or contain noncontiguous districts. But even such seemingly simple constraints require tough choices about *operationalization*. How do we instruct an algorithm to account for the Court's holding in *Tennant v. Jefferson County Commission*, 567 U.S. 758 (2012) (*per curiam*), that a 4,871-person deviation between a State's largest and smallest congressional districts was justified by a combination of three legitimate state objectives (not splitting counties, preserving the cores of prior districts, and preventing contests between incumbent Representatives)?

Worse, even if we overcome these operationalizing challenges, in a *uniform* sample of population-balanced, technically contiguous plans—that is, a sample in which each plan is equally likely to be chosen—plans like the

Arkansas map on the right will enormously outnumber those like the map on the left:



The mathematics behind this phenomenon is complicated. But the intuition is that there are more noncompact plans than compact ones because there are more ways to draw winding lines than straight lines, especially where, as here, there are thousands of building blocks per district.

And those are just the simplest criteria. Redistricting involves many others. How should compactness be operationalized, when the scientific literature contains dozens of competing metrics? Respect for political subdivisions? Keeping communities of interest together? Quantifying, measuring, prioritizing, and reconciling these criteria requires the algorithm designer to make difficult, contestable choices.

This brings us to six key points about sampling algorithms. First, the properties of an ensemble's plans and districts depend heavily on the precise way that each redistricting criterion is *operationalized*.

Second, there is not yet a consensus among mathematicians and computational scientists about which method of sampling algorithm works best. A recent survey identified several broad categories of methods (including random-unit assignment, flood fill, iterative merging, flip-step walk, and recombination walk), each of which admits many variations.[8] And the different methods can generate ensembles with significantly different properties.

Third, a "blind" sampling algorithm that omits a legitimate state objective can have severe consequences. We have already seen, with our second Arkansas map above, the radical impact of a compactness-blind algorithm. Likewise, a contiguity-blind algorithm would generate "districts" containing hundreds of disconnected clumps of census blocks, scattered across the entire state. An algorithm that incorporates population equality, contiguity, and compactness—but is blind to political subdivisions—will generate maps that eviscerate county lines, as demonstrated by the right-hand map of Minnesota below. The two maps show county lines in black and district lines that slice through counties in white. The map on the left is both compact and highly respectful of counties, splitting only two of them. The map on the right is even more compact, but splits 26 counties, because it was generated by a county-blind algorithm.

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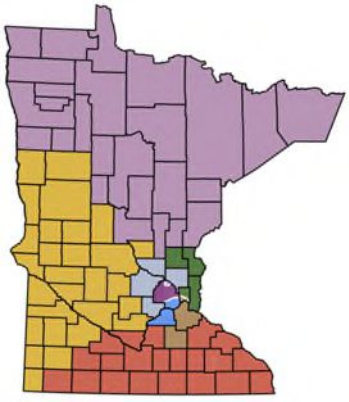
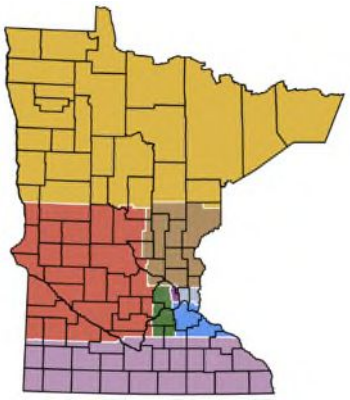
[8] *See* Becker & Solomon, *supra* note 2, at 306 & table 16.1.



"COUNTY-AWARE" MAP
SPLITS 2 COUNTIES



"COUNTY-BLIND" MAP
SPLITS 26 COUNTIES

Likewise, when a sampling algorithm omits all information related to race—whether in the form of unfiltered demographic data, information showing which precincts were won or lost by candidates preferred by a particular racial group's voters, or data about communities defined by actual shared interests that correlate with race—it will likely generate enormous numbers of maps that slice through cohesive neighborhoods and destroy equal electoral opportunity. That is the direct outcome of instructing an algorithm to focus intently on one set of redistricting principles while entirely ignoring another; the latter, having been given no weight, inevitably will suffer. That is true of equal electoral opportunity for citizens of all races, no less than it is true for contiguity, compactness, county integrity, or any other traditional districting principle.

Fourth (and related), one must be careful when using ensembles to answer questions about whether a

districting map is "typical," because each ensemble is a product of the algorithm designer's *tuning*, that is, applying more weight to some maps than others. Depending on how the algorithm is tuned—or, in more technical language, depending on what *nonuniform sampling distribution* the algorithm *targets*—the "average" or "median" map in one ensemble may be quite different from the average or median map in another ensemble, even if the ensembles broadly agree about what constitutes an extreme outlier. In the hands of a skilled algorithm designer who applies ample robustness checks,[9] tuning helps track the State's announced redistricting guidelines and thus also counteracts problems like those illustrated above with the Arkansas and Minnesota maps.

The key here is that these algorithms do not sample from a *uniform* probability distribution, so that each plan is equally likely to be accepted into the ensemble. Instead, each algorithm designer *targets* a known, *nonuniform* probability distribution that is tied to a set of redistricting criteria and priorities. In weighting some kinds of plans more than others, tuning demands tough judgment calls about those criteria and priorities,

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[9] *See Harkenrider v. Hochul*, No. 60, 2022 WL 1236822 (N.Y. Apr. 27, 2022), at *20 (Wilson, J., dissenting) ("Faced with the potential for differently weighting parameters, responsible modelers alter the parameters within reasonable bounds to see whether the alterations make a difference. When the difference is not great, models are robust; when they are great, models are lacking in probative value …. When nobody tests for robustness, invalidating districts … is sheer guesswork.") (citing Becker, Duchin, Gold & Hirsch, *supra* note 2, at 430 & n.31).

and can, intentionally or not, skew the properties of the ensemble's plans and districts. Therefore, when a map is described as "typical" or "average," that label holds little meaning unless one understands the sampling distribution that the algorithm targeted.

Fifth, one must also be careful in using ensembles to answer questions about whether a districting map is "possible," because each ensemble is a product of the algorithm's *sample size*. In theory, if a sampling algorithm is well designed and is allowed to run for a long enough time, it would eventually generate every map that satisfies the algorithm's redistricting criteria. If a map with specific features (*e.g.*, having two majority-Black districts) is found in an ensemble, it certainly is a "possible" map, JA713; but if the map is not found in a particular ensemble, that doesn't render it "impossible." After all, even a million-map sample contains only a microscopic share of the universe of plausible plans.

Sixth, the paradigmatic case in which sampling algorithms have proved useful—though, correctly, no court has ever mandated their use—is to debunk false defenses to ***intent***-based claims. In a typical litigation scenario a plaintiff brings a state-constitutional political-gerrymandering claim alleging that defendants intentionally manipulated district lines to advantage their own political party, and defendants respond that the map's partisan skew is due to the state's political geography and they never considered partisan electoral data. Plaintiff's expert can then present an ensemble from a sampling algorithm that used the same districting criteria that defendants' mapmaker purports to have

used. If the challenged map's properties, including the districts' likely partisan performance, diverge sharply from the properties of the ensemble's maps, it may be reasonable to infer that the mapmaker did in fact intentionally use partisan electoral data to gerrymander. Again, although this type of evidence has correctly been deemed probative by some courts, it has not been, and should not be, required as an essential element of any claim or defense.

C. Optimization Algorithms and Remedial Redistricting

Another application of computational redistricting is for heuristic optimization, or exploration. Optimization algorithms can search for iterative improvements to maps and eventually generate one or a handful of particularly strong maps. In redistricting litigation, optimization algorithms are most useful in providing courts with better remedial options. And good potential remedial maps may also be relevant in the liability phase to demonstrate that the harm plaintiffs allege can in fact be cured. *See infra* Parts II-C and III-B.

An optimization algorithm attempts to find strong plans according to a specific set of criteria. Even if, as is almost always true in the redistricting context, the algorithm never actually finds the very "best" plans (however defined), it can serve a useful function merely by identifying plans superior to ones previously identified. For problems of this complexity, the goal is improvement, not perfection.

Optimization algorithms can help refine proposed plans drawn by humans. And they often can find

innovative combinations of geography that even the most expert human mapmakers may overlook and that will satisfy legitimate redistricting objectives with less cost to other objectives. Two of the *amici* and their coauthors have presented a powerful example of these benefits in a recent peer-reviewed article in the *Election Law Journal*.[10] Based in part on that article, *amici* will describe in Part III-B how voluntarily deploying optimization algorithms can improve outcomes in VRA Section 2 litigation.

II. Voting Rights Act Section 2 Litigation, from the Computational Redistricter's Perspective

Appellants' proposal to require the use of ensembles to prove Section 2 liability is misguided. To see where Appellants have gone astray, *amici* believe it is helpful to take a fresh look at Section 2's plain text, *see infra* Part II-A, and to summarize how Section 2 vote-dilution caselaw interacts with this Court's recent Equal Protection Clause racial-gerrymandering jurisprudence, *see infra* Part II-B. *Amici* will then propose a legal standard that is much more firmly rooted in the statute's text and the relevant caselaw than is Appellants' proposal. *See infra* Part II-C.

A. A Fresh Look at Section 2's Plain Text

While Appellants contend that "confusion has set in" around Section 2 vote-dilution claims, Br. 48, any purported uncertainty flows from inattention to the

[10] Becker, Duchin, Gold & Hirsch, *supra* note 2, at 407–09, 434–39.

statute's plain text. A "fresh look at the statutory text" is thus in order. *Brnovich v. Democratic Nat'l Comm.*, 141 S. Ct. 2321, 2337 (2021).

Subsection (a) of Section 2 echoes the Fifteenth Amendment, with one major exception. Instead of prohibiting voting rules denying or abridging a citizen's right to vote on account of race, *see* U.S. CONST. amend. XV, § 1, it prohibits voting rules imposed or applied "in a manner which ***results in*** a denial or abridgement of … [a citizen's right] to vote on account of race." 52 U.S.C. § 10301(a) (emphasis added).[11] Under this "results test," voters can prove a Section 2 claim by showing discriminatory effect alone. *See Brnovich*, 141 S. Ct. at 2341; *Gingles*, 478 U.S. at 35, 43–44 & n.8.

Subsection (b) elaborates how a plaintiff can establish a violation of subsection (a)'s results test. The citizen challenging a voting rule must show, "based on the totality of circumstances," that "the political processes leading to nomination or election … are not equally open to participation" by members of the citizen's racial group "in that [those] members have less opportunity than other members of the electorate to participate in the political process and to elect representatives of their choice." 52 U.S.C. § 10301(b). Requiring consideration of "the totality of circumstances" permits consideration of "any

[11] In addition to race, the Act addresses membership in certain language minority groups. *See id.*; *see also id.* § 10303(f)(2); *id.* § 10310(c)(3) (defining "language minority group"). This brief's analysis and conclusions apply to "members of a[ny] class of citizens protected by [Section 2]." *Id.* § 10301(b).

circumstance that has a logical bearing on whether voting is 'equally open' and affords equal 'opportunity.'" *Brnovich*, 141 S. Ct. at 2338. However, the statute expressly lists only one circumstance that "may be considered" in "the totality of circumstances": the "extent to which members of [the citizen's racial group] have been elected to office." 52 U.S.C. § 10301(b). The statute then provides that nothing in Section 2 "establishes a right to have [these] members … elected in numbers equal to their proportion in the population." *Id.*

In the redistricting context, Section 2's plain text ensures there can be no right without a remedy. Properly construed, the text requires a plaintiff to show not only that the district where he resides and votes will deny him equal electoral opportunity but also that his injury could be remedied by replacing the challenged map with a map he proposes. As the six-step textual analysis set forth below will show, the plaintiff must propose one lawful remedial map—not thousands or millions of them.

First, Section 2 has no impact unless voting in the vicinity of the plaintiff's residence is racially polarized. Where members of the plaintiff's racial group and "other members of the electorate" support the same candidates—that is, the "representatives of their choice" are identical—those candidates will always win office. It therefore would be impossible for the plaintiff to establish that the composition of his district could abridge his right to vote "on account of race."

Second, where voting is racially polarized, then either the members of the plaintiff's racial group will successfully elect the candidate "of their choice" or the "other members of the electorate" will successfully elect the (different) candidate "of ***their*** choice" (emphasis added). By definition, both "choice[s]" cannot win.

Third, Section 2 requires a holistic, jurisdiction-wide analysis. The question whether "the political processes leading to nomination or election" are "equally open" to members of the plaintiff's racial group requires considering all districts in the jurisdiction ("the State or political subdivision"). This is why the statute, while protecting individual rights, refers to the opportunity of "members" (plural) of a racial group to elect "representatives" (plural) of "their" (plural) choice. And the text's focus on jurisdiction-wide results is underscored by the one "circumstance" that the statute singles out for consideration: the number of "members" (again, plural) of plaintiff's racial group "elected to office ***in the State or political subdivision***" (emphasis added).

Fourth, Section 2 respects our territorial form of representation and thus does not demand proportionality. By expressly disclaiming a right to have members of any racial group "elected in numbers equal to their proportion in the population," the statute rejects a pure disparate-impact regime and impliedly acknowledges that our electoral system depends on territorial representation. Each "representative[]" is nominated and elected from a precise, geographically defined area. If an evenly dispersed racial group loses in every district, that is on account of its dispersion, not "on

account of race." So, in the redistricting context, just as Section 2's impact rests on racial polarization in voting, it also rests on racial segregation in housing. If, in the vicinity of plaintiff's residence, either electoral politics or residential housing is truly colorblind, Section 2 can play no role.

Fifth, Section 2 does not demand maximizing any group's voting strength. Where race does correlate significantly with both voting and housing patterns, a map providing citizens of ***each*** race an opportunity to nominate and elect "representatives of their choice" in a number of districts "equal to their proportion in the population" would ordinarily satisfy Section 2. If each group—white citizens and "other [*i.e.*, non-white] members of the electorate," Black citizens and "other [*i.e.*, non-Black] members of the electorate," and so on—has the opportunity to nominate and elect its preferred candidates in a number of districts that is roughly proportional to its share of the State's population, then no citizen can complain that the districting plan renders the State's political processes not "equally open" or abridges his right to vote "on account of race." This also shows why Section 2 does not call for racial maximization. Where voting is polarized, maximizing the number of districts that elect one group's preferred candidates will minimize another group's electoral opportunities. So maximization for one group can create liability to another. Hence, there can be no right under Section 2 to maximized representation for any racial group.

Sixth, Section 2's use of the term "abridgement" necessarily entails a comparison of the challenged voting rule with one alternative. As Justice Scalia explained, "[i]t makes no sense to suggest that a voting practice 'abridges' the right to vote without some baseline with which to compare the practice." *Reno v. Bossier Parish Sch. Bd.*, 528 U.S. 320, 334 (2000). And in a Section 2 vote-dilution case, the baseline is "a hypothetical alternative." *Id.*

Section 2 redistricting litigation thus typically boils down to a simple question: Does the law require replacing one or more districts where "other members of the electorate" can nominate and elect "representatives of their choice" with districts where members of the plaintiff's racial group, with their own distinctive "choice[s]," can do so? This requires comparing (a) the challenged plan with (b) ***one*** proposed remedial plan, while focusing of course on the district in each plan where the plaintiff resides and would vote. Nothing in Section 2's text calls for a sample of millions of maps.

B. A Brief Overview of the Law of Race and Redistricting

1. How the Court Interpreted Section 2 in *Gingles* and *Growe*

Ever since the Court handed down *Gingles* in 1986, plaintiffs bringing Section 2 vote-dilution claims have been required, before addressing the "totality" of circumstances as the statute mandates, to establish three specific circumstances, or "preconditions." *Gingles*, 478 U.S. at 50–51, 79. The conditions are that (1) plaintiff's racial group is "sufficiently large and

geographically compact to constitute a majority" in an additional single-member district; (2) the group is "politically cohesive"; and (3) other members of the electorate vote "sufficiently as a bloc" to enable them "usually to defeat the … preferred candidate" of voters in plaintiff's racial group. *Id.* at 50–51.

The *Gingles* threshold conditions serve a useful gatekeeping function: A case brought by a plaintiff who cannot make out all three preconditions can typically be dismissed at summary judgment, obviating the need for a full trial covering the "totality of circumstances."

A second benefit of the *Gingles* test—although only as initially formulated (*see infra* Part II-B-4)—was that it required the plaintiff to produce a potential remedy (an "illustrative" map) at the litigation's liability phase, rather than waiting for the remedial phase. This prevented a district court from finding for the plaintiff on liability, only to discover later that there was no feasible remedy for plaintiff's injury.

In *Growe v. Emison*, 507 U.S. 25 (1993), when this Court first applied *Gingles* to a districting plan composed solely of single-member districts, Justice Scalia, writing for a unanimous Court, succinctly unpacked how this three-prong test boiled down to a two-part issue: The first and second *Gingles* conditions, Justice Scalia explained, "are needed to establish that the [plaintiff's group] has the potential to elect a representative of its own choice in [a] single-member district" proposed by the plaintiff. *Id.* at 40. And the second and third *Gingles* conditions "are needed to establish that the challenged districting thwarts" the

group's distinctive vote. *Id.* "Unless these points are established, there neither has been a wrong nor can be a remedy," Justice Scalia concluded. *Id.* at 40–41.

2. Compactness and the Rise of the Racial-Gerrymandering Doctrine

Initially, legislators, lower courts, and especially the U.S. Department of Justice (DOJ) paid little heed to *Gingles*'s call for districts that were "sufficiently … geographically compact." *Gingles*, 478 U.S. at 50. Often under pressure from DOJ, States in the early 1990s, hoping to minimize VRA exposure, enacted noncompact majority-Black and majority-Latino districts whose boundaries were "so irrational on [their] face that [they could] be understood only as an effort to segregate voters into separate voting districts because of their race." *Shaw v. Reno*, 509 U.S. 630, 658 (1993) (*Shaw I*). Finding these districts "'by their very nature odious,'" *id.* at 643 (citation omitted), this Court held them presumptively unconstitutional and subjected them to strict scrutiny under the Equal Protection Clause, U.S. CONST. amend. XIV, § 1; *see, e.g.*, *Shaw v. Hunt*, 517 U.S. 899, 908–18 (1996) (*Shaw II*).

The linchpin to the Equal Protection inquiry is racial ***predominance***. A district is presumptively unconstitutional and thus subject to strict scrutiny if "race was the predominant factor motivating the … decision to place a significant number of voters within or without [the] district." *Miller v. Johnson*, 515 U.S. 900, 916 (1995).

Importantly, a political mapmaker's mere awareness, or even consideration, of race does not

render a district presumptively unconstitutional. "[T]his Court has long recognized '[t]he distinction between being aware of racial considerations and being motivated by them.'" *North Carolina v. Covington*, 138 S. Ct. 2548, 2554 (2018) (quoting *Miller*, 515 U.S. at 916). "[T]he legislature always is ***aware*** of race when it draws district lines, just as it is aware of age, economic status, religious and political persuasion, and a variety of other demographic factors. That sort of race consciousness does not lead inevitably to impermissible race discrimination." *Shaw I*, 509 U.S. at 646.

In the 1990s and early 2000s, the *Shaw* racial-gerrymandering doctrine focused on racial predominance through "subordinat[ion]" of traditional race-neutral districting principles to racial considerations. *Miller*, 515 U.S. at 916. The list of redistricting principles that qualify as "traditional" varies by state, but typically includes criteria such as contiguity, compactness, respect for political subdivisions, and respect for communities defined by actual shared interests. *See id.*; *see also Bush v. Vera*, 517 U.S. 952, 964, 968 (1996) (principal opinion).

While not strictly required by the *Shaw* doctrine—which of course governs only state action—private plaintiffs in Section 2 redistricting cases generally avoided proposing *Gingles* illustrative districts whose boundaries were excessively race-based, and courts generally avoided relying on such maps. That balance helped harmonize the Equal Protection Clause, which restricts consideration of race, and the VRA, which demands consideration of race.

3. *Bartlett v. Strickland* and the 50% Rule

Prior to this Court's ruling in *Bartlett v. Strickland*, 556 U.S. 1 (2009), there had been some confusion in the lower courts about the meaning of the first *Gingles* precondition's numerosity requirement. Following the statute's plain text, a handful of courts had understood the *Gingles* requirement functionally, to require that plaintiff's racial group be sufficiently large "to elect representatives of their choice" in an additional district. 52 U.S.C. § 10301(b). Under this reading, a plaintiff could satisfy *Gingles*'s first precondition by proposing a "crossover" district where members of his racial group would constitute less than half the voting-age population (VAP) yet routinely elect their preferred candidates with limited but predictable crossover support from other voters. In *Strickland*, the Court rejected that position and held that *Gingles* required a literal, arithmetic "majority" and that Section 2 "does not mandate" crossover districts. 556 U.S. at 23 (plurality opinion).

But the *Strickland* Court did not denigrate crossover districts. Far from it. Justice Kennedy explained that crossover districts may "diminish the significance and influence of race by encouraging minority and majority voters to work together toward a common goal" and thus "lead to less racial isolation, not more." *Id.* "The Voting Rights Act was passed to foster this cooperation." *Id.* at 25. The plurality even proclaimed that States could, and properly should, defend themselves against Section 2 allegations by creating crossover districts, which can

serve as evidence of "equal political opportunity" under the Act's totality-of-circumstances analysis. *Id.* at 24. Furthermore, intentionally destroying a crossover district, Justice Kennedy noted, "would raise serious [constitutional] questions." *Id.* So, where voting and residential patterns made them feasible, crossover districts were, if anything, the preferred remedy for adjudicated, or potential, VRA violations, whether maps were enacted by legislatures or ordered by courts.

4. The Racial-Targeting Cases of the 2010s

Not long after *Strickland* came down, a new line of racial-gerrymandering cases about plans drawn after the 2010 Census emerged. In *Alabama Legislative Black Caucus v. Alabama*, 575 U.S. 254 (2015), the Court suggested that it was constitutionally problematic for a State to draw districts to meet "a particular numerical minority percentage" or "mechanical racial targets." *Id.* at 267, 273–75. So racial predominance could potentially be proved if the State had ***targeted*** a particular racial percentage.

Two Terms later, in *Bethune-Hill v. Virginia State Board of Elections*, 137 S. Ct. 788 (2017), the Court held that in some circumstances racial-percentage targeting could trigger strict scrutiny, even without a specific conflict with traditional districting principles, where a "holistic analysis" indicated the legislature's predominant motive was race-based. *Id.* at 800; *see also id.* at 798–99. And in *Cooper v. Harris*, 137 S. Ct. 1455 (2017), the Court held that a legislature's decision to convert "a successful crossover district" into a majority-

Black district was excessively race-based, could not be justified by "a proper interpretation" of Section 2, "rested … instead on a pure error of law," and thus violated the Equal Protection Clause. *Id.* at 1472; *see also id.* at 1468–69 (holding that "the 50%-plus racial target 'had a direct and significant impact'" on the district's configuration (citation omitted)).

This new strand of the *Shaw* racial-gerrymandering doctrine about targeting specific demographic percentages implicated Section 2 as interpreted in *Bartlett v. Strickland*. The *Strickland* holding requires plaintiffs to draw and present *Gingles* illustrative maps with districts in which members of their own racial group constitute at least a hair above 50% of the district's VAP. But the new racial-targeting cases instruct courts to treat skeptically any district designed to meet "a particular numerical minority percentage." *Alabama Legislative Black Caucus*, 575 U.S. at 275. Thus, the structure Justice Scalia set out in *Growe* is now problematic. No longer will a *Gingles* illustrative district prove the existence of a remedy, because after *Cooper v. Harris*, a compact district designed to satisfy *Strickland*'s 50%-plus requirement could (if enacted or ordered into effect) potentially trigger strict scrutiny. Therefore, often the only constitutional remedy will be a compact crossover district that would be ineligible to serve as a *Gingles* illustrative district.

C. Restoring Justice Scalia's *Growe* Framework by Adjusting Plaintiffs' Burdens

Appellants suggest that, if it is now presumptively unconstitutional to draw a *Gingles* illustrative district to hit the 50%-plus racial target expressly demanded by *Strickland*, then Section 2 should be invalidated, at least as applied to single-member districts. *See* Br. 71–79. This suggestion to throw the baby out with the bathwater is misguided. Instead, the Court should return to the statute's plain text and require plaintiffs to show at the liability phase, "based on the totality of circumstances," that there is a constitutionally proper remedy for the Section 2 claim they allege. The availability of a lawful remedy is surely one circumstance meriting consideration in "the totality of circumstances," and requiring plaintiffs to show a lawful remedy at the liability phase would restore the framework Justice Scalia set forth in *Growe*.

Amici suggest that the Court clarify three legal points:

- To satisfy *Gingles*'s first precondition, a Section 2 plaintiff may create and present an illustrative district to meet an express, mechanical racial target of 50% VAP for plaintiff's racial group, so long as the illustrative district does not subordinate traditional race-neutral districting principles to racial considerations.
- To satisfy Section 2's totality-of-circumstances inquiry and thus prevail on liability, a Section 2 plaintiff must establish that either an illustrative

plan that the plaintiff created and presented to satisfy *Gingles*'s first precondition or some other plan that the plaintiff created and presented would remedy the alleged Section 2 violation and satisfy all other applicable laws, including both the racial-subordination and the racial-targeting strands of the *Shaw* racial-gerrymandering doctrine.

- A district will satisfy strict scrutiny under either strand of the *Shaw* racial-gerrymandering doctrine if it is narrowly tailored to achieve a compelling state interest in complying with Section 2's results test and, in creating the district, race was not considered substantially more than was necessary to afford all "members of the electorate" an equal "opportunity … to participate in the political process and to elect representatives of their choice." 52 U.S.C. § 10301(b).

The first bullet restates current law. But the last two bullets would add a significant burden to plaintiffs at the liability phase of a Section 2 suit.

Amici believe these clarifications to the law are the best way to harmonize this Court's precedents. Where it just happens that a district that is 50.1% Black in VAP is needed to provide Black voters an equal opportunity "to elect representatives of their choice," proving that plaintiff's *Gingles* illustrative plan is constitutional may suffice. But in a situation where, say, a 42% Black crossover district would elect a candidate preferred by Black voters, a plaintiff might need to present both an

illustrative plan with a majority-Black district (to satisfy the *Gingles* test as interpreted by *Strickland*) and a potential remedial plan with a Black crossover district that does not consider race substantially more than is necessary to afford Black voters an equal opportunity to elect their preferred candidates. Mandating that plaintiffs present a lawful remedy during the liability phase would restore the balanced structure that Justice Scalia lauded in *Growe*.

With these new requirements in place for Section 2 plaintiffs, going forward there would be no need to show the impossible—that a *Gingles* illustrative district whose VAP barely exceeds 50% is somehow entirely free from racial considerations. The illustrative district would no longer have to serve as the plaintiff's presumptive remedial district, so its "constitutionality" (again, a mythical feature absent any state action) would ordinarily be of no moment. What would matter is the constitutionality of the plaintiff's proposed remedial district, which the plaintiff would now need to produce during the litigation's liability phase to satisfy the totality-of-circumstances inquiry.[12]

III. The Proper Role of Computational Redistricting in Section 2 Litigation

Amici turn next to describing the limited, but useful, role that computational redistricting can play in Section

[12] Of course, neither defendants nor the court would have to adopt plaintiff's proposed remedy. *See Shaw II*, 517 U.S. at 917 n.9; *Growe*, 507 U.S. at 34.

2 litigation and assessing the role it played below. As an initial matter, because Section 2's plain text asks whether a plan "results in" abridgement of plaintiff's right to vote, and thus requires no proof of discriminatory intent, *see Brnovich*, 141 S. Ct. at 2341, the paradigmatic use of sampling algorithms in redistricting litigation (*see supra* Part I-B) is inapplicable in Section 2 cases.

A. Appellants' Proposed Test Should Be Rejected.

Appellants propose requiring Section 2 vote-dilution plaintiffs to "show that the enacted plan produced fewer majority-minority districts than what would be expected from a race-neutral districting process." Br. 45. The "race-neutral districting process" they identify is a sampling algorithm using no racial data. *See id.* at 23 & n.5, 54–55; *see also id.* at 22–23, 55 (describing 20,000 maps that Dr. Imai generated with an algorithm that did use racial data). So, under Appellants' theory, plaintiffs challenging a plan with only one majority-Black VAP district would have to show that the median map in an ensemble generated by a race-blind sampling algorithm "would be expected" to contain at least two majority-Black VAP districts. *See Gonzalez v. City of Aurora*, 535 F.3d 594, 600 (7th Cir. 2008) (Easterbrook, C.J.) (wondering whether "at least 50%" of 1,000 "random, race-blind" computer-generated maps would have yielded an additional Latino district).

Appellants' proposed test should be rejected for three reasons.

First, Appellants' call for millions of maps drawn totally without regard to race would privilege a line-drawing method that is not required by the Constitution and in some cases may be prohibited by it. This Court has repeatedly held that awareness of race and even consideration of race, so long as it falls short of predominance, are not only constitutional but often proper, given the traditional principle that redistricters should respect communities defined by actual shared interests. *See, e.g.*, *Covington*, 138 S. Ct. at 2554; *Miller*, 515 U.S. at 916, 920; *Shaw I*, 509 U.S. at 642, 646. And as Justice Kennedy explained in *Strickland*, destroying a preexisting Black crossover district could "raise serious questions under both the Fourteenth and Fifteenth Amendments." 556 U.S. at 24 (plurality opinion).

Second, applying Appellants' proposed test nationwide could decimate minority electoral opportunities and minority officeholding. It is telling that, in this very case, the bulk of the Alabama congressional maps in the two-million-map ensemble that Appellants trumpet contained ***zero*** majority-Black VAP districts.[13]

For reasons explained above in Part I-B, ascertaining the real-world consequences of adopting Appellants' proposed test is enormously complex—which is itself a good argument for not foisting the test

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[13] *See* Moon Duchin & Douglas M. Spencer, *Models, Race, and the Law*, 130 YALE L.J. F. 744, 764–65 (2021) (finding in 14 of 19 heavily minority States, including Alabama, median maps with zero majority-Black VAP congressional districts).

on the lower courts. More modeling and analysis are needed; but two competing studies that recently tried to address this issue, using divergent methodologies, both found that "race-blind districting would devastate electoral opportunity for minority" citizens.[14] This is hardly surprising, given that any districting principle or objective omitted from a sampling algorithm will suffer severe consequences. *See supra* Part I-B. Appellants' proposal simply does to minority communities what the Arkansas and Minnesota maps did to compactness and county integrity. *See id.*

Third, Appellants' proposed test demands exactly what sampling algorithms are ill-equipped to show. As explained in Part I-B, precise values such as the number of majority-Black districts in an ensemble's median plan can be hyper-sensitive to a laundry list of user choices, including how each districting criterion is operationalized, how the full suite of criteria are weighted, which broad category of sampling algorithms is selected, which specific variant within that broad category is deployed, and which nonuniform probability distribution the algorithm targeted. So in a Section 2 case, the judge will have to choose between a plaintiff's ensemble whose median map contains more minority districts and a defendant's ensemble whose median map

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[14] Duchin & Spencer, *supra* note 13, at 749; *see also* Jowei Chen & Nicholas O. Stephanopoulos, *The Race-Blind Future of Voting Rights*, 130 YALE L.J. 862, 946 (2021) ("minority representation would decrease considerably since numerous existing opportunity districts, crafted to comply with the prevailing understanding of section 2, would vanish").

contains fewer, with each side asserting the superiority of its user choices. Appellants offer no coherent standard for resolving these competing claims.

This is the same problem the Court flagged in *Rucho v. Common Cause*, 139 S. Ct. 2484 (2019): "It is easy to imagine how different criteria could move the median map toward different … distributions," so "the same map could be [lawful] or not depending solely on what the mapmakers said they set out to do. That possibility illustrates that [this] proposed … test is indeterminate and arbitrary." *Id.* at 2505.

Especially arbitrary is Appellants' repeated invocation of "[e]vidence regarding ***millions*** of race-neutral redistricting simulations" lacking two majority-Black districts, which were created by "[o]ne of Plaintiffs' experts" for a study written before the Census Bureau released the 2020 data. Br. 54–55 (emphasis added); *see id.* at iv, 1, 23, 30–31, 56, 70, 79 (describing "millions" of maps). No party introduced the expert's study into evidence. And neither the maps themselves, nor the algorithm that generated them, nor detailed statistics summarizing their properties are in the record.[15] The algorithm used stale Census data that was more than a decade old. It did not satisfy Alabama's (or the Federal Constitution's) equal-population standard for congressional maps, even under the old

[15] *But see* JA713 (expert testifying on cross-examination that one of the two million maps might well have "had a majority-[B]lack district and a second that was 49.999 [percent Black]").

Census.[16] It did not draw districts using either census blocks or voting precincts as the foundational units.[17] It did not consider counties.[18] It did not consider cities or towns.[19] It did not consider communities defined by actual shared interests.[20] And it did not assess whether any of the majority-Black districts it drew—or any of the majority-non-Black districts—would provide Black voters an "opportunity … to elect representatives of their choice."[21] 52 U.S.C. § 10301(b). It would be hard to cook up a less helpful piece of "evidence."

B. Optimization Algorithms Can Restrict the Consideration of Race While Fostering Equal Electoral Opportunity for All Americans.

Unlike sampling algorithms that generate samples of millions of maps, optimization algorithms that search for better maps on specified criteria can sometimes play a useful—though never mandatory—role in Section 2 litigation. As discussed above in Part II-C, *amici* believe that the Court should now require Section 2 results-test vote-dilution plaintiffs to propose a remedial

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[16] *See* Duchin & Spencer, *supra* note 13, at 763 ("each district [was] within ***2%*** of ideal size" (emphasis added)).

[17] *See id.* at 763 n.74.

[18] *See id.* at 763.

[19] *See id.*

[20] *See id.*

[21] *See id.* at 767 (describing algorithm's focus on "raw demographics," not electoral effectiveness).

plan that fully complies with the Equal Protection Clause during the liability phase. Sometimes, that plan may be the exact same map the plaintiff presented to satisfy the first *Gingles* precondition. Often, however, the remedial plan will instead feature a "crossover" district that would be ineligible to satisfy *Gingles*, as interpreted in *Strickland*. In either case, the proposed remedial district should rely on traditional districting principles and generally should not consider race substantially more than necessary to afford voters an equal "opportunity … to elect representatives of their choice." 52 U.S.C. § 10301(b). And a plaintiff need produce only one such "hypothetical alternative" district—not a thousand or a million. *Bossier Parish*, 528 U.S. at 334.

Optimization algorithms are well-suited to the task of generating these proposed remedies for two reasons. First, an algorithm can take a plan, whether initially generated by a computer or a human, and improve its adherence to traditional districting principles such as compactness or respect for political subdivisions or communities of interest. For example, an optimization algorithm can systematically search for revisions to a map that would hold most of its good properties constant while dividing fewer counties or unsplitting a municipality or improving a compactness metric. A well-designed algorithm often can identify innovative combinations of geography that better comply with multiple traditional principles than any individual mapmaker is likely to find manually through trial and error.

Second, as demonstrated in a recent peer-reviewed article coauthored by two of the *amici*,[22] optimization algorithms can speedily analyze how a proposed district voted in literally dozens of recent primary and general elections, to determine how frequently the candidates preferred by voters from plaintiff's racial group prevailed. So the algorithm can simultaneously apply traditional districting principles and focus on what Section 2's plain text demands—an assessment of the voters' "opportunit[ies] … to elect representatives of their choice"—rather than relying on raw demographics alone. Every time the algorithm draws a new version of a compact district around the plaintiff's home, it can make "'an intensely local appraisal'" of that district, *Gingles*, 478 U.S. at 79 (citation omitted), based not on stereotypes or statewide patterns or crude quotas but rather on precise data about the voting history in that exact district. When trying to follow traditional districting principles and ensure equal electoral opportunity without considering race substantially more than necessary, litigants and courts alike may wish to harness the power of high-performance computing.[23]

Because this case was stayed before its remedial phase, the record below contains no examples of this use of optimization algorithms. But it does contain a brief mention of an analogous use. The expert who created the Milligan plaintiffs' *Gingles* illustrative plans testified

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[22] Becker, Duchin, Gold & Hirsch, *supra* note 2, at 407–09, 434–39.

[23] *See, e.g.*, Brief *Amicus Curiae* in Support of Neither Party, *Robinson v. Ardoin*, No. 3:22-cv-211 (M.D. La. Apr. 29, 2022), Dkt. 97.

that, before manually drawing them, she used an algorithm to see if it was possible for a map to respect traditional principles like compactness and also include two majority-Black VAP districts. JA621–23, 655–56, 708–10. She testified that the algorithm found "literally thousands of different ways" to accomplish this goal, which then served as inspiration as she manually drew the illustrative maps. JA622; *see* JA634. This is a good example of how an algorithm can be used not only to draw a remedial districting plan but also a *Gingles* illustrative map.

CONCLUSION

The judgment below should be affirmed.

Respectfully submitted,

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