

A PRIMER

All About Texas Redistricting - Gerrymandering

Governor Abbott issued a proclamation with agenda items for the 1st Called Session of the 89th Legislature (which has a 30 day time limit) set to begin on July 21, 2025, which includes, “*Legislation that provides a revised congressional redistricting plan in light of constitutional concerns raised by the U.S. Department of Justice.*”

The Department of Justice (DOJ) concerns centered around racial discrimination in some voting districts, and hence the reason (some argue an excuse) for the Governor to advance redistricting legislation based on DOJ concerns, thereby dodging accusations of Maga/Republican gerrymandered redistricting initiative promoted by President Trump and Governor Abbott.

Analysts report the White House and the Republican leadership are nervous about the midterm elections (loss of Republican seats) and hence why redistricting comes outside typical redistricting times. Historically, the president's party typically doesn't do well in midterm elections. If the president's party can squeeze a few more seats out of places like Texas and Ohio, that might make the difference between a small Republican majority versus a small Democratic majority.

Recent news reporting suggests that some Democratic leaders have urged Texas Democrats to attempt a *quorum break* - a rare move in which members of a party walk out of a session to reduce the quorum to a number too low to pass legislation. A quorum break is problematic because the special session agenda is also jamb packed with other social legislative issues important to all Texans no matter the party. It's possible lawmakers won't pass everything the governor wants in the 30-day limit on a special session, prompting a possible second special session.

Governor Abbott's published a comment that the Democrats must put aside partisan political quorum breaking games and get back to the job they were elected to do.

Some good advice the Governor should also adopt and equally not play partisan gerrymandering games.

The U.S. District Court for the Western District of Texas heard oral arguments in the consolidated redistricting lawsuits, *LULAC v. Abbott*, in May and June 2025. The court has ordered all parties to submit post-trial briefs, including proposed Findings of Fact and Conclusions of Law due on or before September 3, 2025.

REDISTRICTING GERRYMANDERING ...
TEXAS LEGISLATOR AWARENESS CHECKLIST...COMPLIANCE WITH LAW

- ✓ Texas courts tend to consider redistricting a political question, not ‘illegal’ in and of itself, hence the courts generally will not intervene with the process – a non-judicial issue.
- ✓ Texas courts have not considered a case where the sole purpose of redistricting is for gerrymandering partisan purposes.
 - President Trump’s public comments concerning explicit gerrymandering results to increase republican representation in Texas is somewhat problematic regarding the intention of redistricting...Department of Justice coincidental and unusual timely racial discrimination concern aside, – a convenient coincident?
- ✓ Gerrymandering can be illegal
 - If it violates civil rights discrimination laws (colour, race, religion, etc.); particularly Voting Rights Act of 1965 or Amendment 15 of the Constitution.
 - If voting is conditioned on ability to read, write, understand, or interpret any matter in the English language.
 - If it has the capacity to intimidate, threaten, or coerce anyone associated with their right to vote. (A risk if gerrymandered redistricting inherently places voters in such positions).
 - If the gerrymandered redistricting material affects or influences: registration, listing pursuant to this Act, or other action required by law prerequisite to voting, casting a ballot, and having such ballot counted properly and included in the appropriate totals of votes cast with respect to candidates for public or party office and propositions for which votes are received in an election.
 - If redistricting is so unnatural, absurd or tortured, the courts have the discretion to consider it inherently contravenes the Voter Rights Act of 1965 or Constitution, particularly where redistricting results in voter frustration and disengagement from the political process – in effect inherently preventing the exercise of one’s legal voting rights.
- ✓ Did redistricting map making technicians use or have access to any other population or voter data and statistics or related information other than what is publicly available from the **Capital Data Portal**?
 - If so, does the public have immediate equal free access to the same information?
- ✓ Does redistricting adhere to the basic standard for the maximum acceptable population deviation for state legislative districts: the combined deviation of the most populous district and the least populous district from the ideal district population may not exceed 10 percent, and all the other district populations must fall within that narrow range. (*White v. Regester*, 412 U.S. 755 (1973))
- ✓ Does redistricting for State Senate seats consist only of contiguous territory?
- ✓ Is redistricting for State Representative seats based on the State’s Constitution county-line rules?
- ✓ Are congressional districts drawn such that each deviation from the ideal district size must be justified on the basis of a rational state policy or be found to be unavoidable despite a good

faith effort to draw districts with equal population (*Karcher v. Daggett*, 462 U.S. 725 (1983)). As a result, congressional districts are drawn to be almost exactly the same in population.

- ✓ Does redistricting plan adhere to the primary requirements governing redistricting in that districts of a given type must have equal or nearly equal populations. Ideal district population is the population a district would have if all districts in a plan have equal populations, and it is determined by dividing the total state population by the number of districts in the plan.
- ✓ Will official state redistricting maps and statistics be generated only by **RedAppl**? (RedAppl, pronounced 'Red Apple', graphical computer software associated with Redistricting Application)
- ✓ Are redistricting map boundary locations reasonable in shape, contiguous and not contain tortured 'salamander' like designs that smacks of gerrymandering overreaching?
- ✓ Are redistricting maps independently checked for fairness and compliance with the Voting Rights Act and the Constitution, by independent objective data base and statistic analysts such as **Data and Democracy Lab** or **PlanScore**?
 - If others, who are they? ;
 - Are independent analyst audit reports and information available to the public?
- ✓ Has the redistricting process allowed for reasonable and adequate time schedules for public comments as well as the public submitting redistricting maps?
 - A 30 day max. special session does not appear reasonable to define redistricting maps especially those prepared by the public.
- ✓ Has redistricting maps been subject to 'packing' or 'cracking' analysis in regard to partisan redistricting results, and if so, is that information available to the public, and if not, why not?
- ✓ Have legislators been timely and reasonably briefed in layman understood format as to what extent the redistricting mapping software and proces has been subject to
 - "seed and grow" techniques, "Markov chain Monte Carlo or MCMC" graphing techniques, "flip-based" techniques, Perron-Frobenius theorem, ReCom technique to create spanning tree graphs, "sequential Monte Carlo or SMC" techniques or use of the "efficiency gap" analysis to assess gerrymandering?
 - If not, what analytical and software processes have been used?
- ✓ Lawsuits brought to challenge redistricting maps must be timely filed to avoid disturbance of the election process.
- ✓ Lawsuits must be brought by plaintiffs who have standing to sue. Standing requires showing at least, "injury in fact". To show injury in fact, a plaintiff must show that she has suffered "invasion of a legally protected interest" that is "concrete and particularized." Merely a showing of statewide harm of alleged partisan gerrymandering is insufficient injury in fact.
- ✓ *Art of the Deal suggestion*:
 - To Governor Abbott: we Democrats will not advance a quorum break
 - if you agree not to invoke gerrymandering in the redistricting process.
 - Option: A separate second special session just for redistricting and a separate first special session for all the other proposed agenda items
- ✓ Since redistricting involves new legislation and implementation, it is presumed an appropriations bill is needed to fund the effort.
- ✓ If redistricting maps miraculously appear a few days after the start of the special session, then under what authority and appropriations was that work progressed before the session,

since it takes a significant effort (time and resources) to develop redistricting maps and associated statistics which cannot happen a few days?

QUICK REFERENCE REDISTRICTING CHECKLIST TEST

CHECKLIST ITEM	NONPARTISAN COMPLIANT CIRCUMSTANCE
Gerrymandering legal in Texas	<ul style="list-style-type: none"> • Yes – up to a point • a non-judiciable political question
Gerrymandering illegal and must not :	<ul style="list-style-type: none"> • Discriminate against colour, race, religion • Require command of the English language • Designed to cause right to vote intimidation, threat, or coercion (direct or indirect effect from shape of redistricting map) • Cause redistricting maps to be absurd, unnatural or tortured basis of plan.
Redistricting population and voter statistics information sourced only from Capital Data Portal	Yes
State legislative district maps adhere to maximum deviation populations	Yes
State Senate seat district boundaries consist only of contiguous territory	Yes
State Representative seat district boundaries based on ‘county-line rule’	<ul style="list-style-type: none"> • Yes, • population affected district map boundaries could be one county, multiple counties, multiple districts in one county
Federal Congressional district boundaries adhere to good faith equal population structure.	<ul style="list-style-type: none"> • Yes, • equal population districts for congressional seats
Redistricting maps and statistics determined only with RedAppl redistricting application software	Yes
Redistricting map boundary and structure primarily reasonable in shape, contiguous and not contain tortured ‘salamander’ like designs	Yes
Redistricting maps and data are verified for accuracy and reasonableness by independent sources such as Data and Democracy Lab or PlanScore	Yes
Redistricting maps have been assessed by independent sources for partisan ‘packing’ or ‘cracking’ analysis	Yes

<p>Redistricting software has incorporated industry state of the art objective technology</p>	<ul style="list-style-type: none"> • Yes • “seed and grow” techniques, “Markov chain Monte Carlo or MCMC” graphing techniques, “flip-based” techniques, Perron-Frobenius theorem, ReCom technique to create spanning tree graphs, “sequential Monte Carlo or SMC” techniques or use of the “efficiency gap” analysis to assess gerrymandering
<p>Balance agreement to not invoke quorum break action with agreement not to advance redistricting based on gerrymandering objectives.</p>	<p>?</p>
<p>Prior to the special session, no funds or resources were spent or used on redistricting initiatives since such act requires legislator legislation approval and passage of appropriation bill</p>	<p>Yes</p>

Redistricting Process

See: <https://redistricting.capitol.texas.gov/Current-districts#judicial-section> for access to latest redistricting maps in Texas.

Legal:

Redistricting is affected by The Voting Rights Act of 1965, landmark civil rights legislation that aimed to overcome legal barriers at the state and local levels that prevented African Americans from exercising their right to vote, as guaranteed under the 15th Amendment to the U.S. Constitution.

Key Provisions and Impact:

Prohibition of discriminatory voting practices:

- The Act banned discriminatory practices like literacy tests and other devices used to prevent minority voters from registering or voting.
- Federal oversight of elections:
- It authorized the federal government to oversee voter registration and elections in areas with a history of discrimination, including sending federal examiners to register voters and observers to polling places.
- Preclearance requirement:
 - Certain states and jurisdictions with a history of discriminatory voting practices were required to get any changes to their voting laws "precleared" by the Department of Justice or a federal court before they could take effect.
- Language minority protections:
 - The Act was amended to include protections for members of language minority groups, requiring bilingual election materials and assistance where needed.

Ongoing relevance:

Despite the Supreme Court striking down some of its provisions in 2013, the Voting Rights Act remains a critical piece of legislation, though its scope and application are continuously debated and challenged.

In essence, the Voting Rights Act of 1965 is a powerful tool to ensure equal access to the ballot box for all citizens, regardless of race or other protected characteristics, and its legacy continues to shape the landscape of American democracy.

Redistricting is the revision or replacement of existing electoral districts, resulting in new districts with different geographical boundaries. The basic purpose of decennial redistricting is to equalize population among electoral districts after publication of the United States decennial census indicates population has increased or decreased over the last decade.

The Texas Constitution requires the legislature to redistrict Texas house and senate seats during its first regular session following publication of each United States decennial census (Section 28, Article III).

Two primary requirements govern redistricting in Texas.

1. First, representative districts of a given type (senate, house, congressional, and the State Board of Education (SBOE) as well as local government single-member districts) must have equal or nearly equal populations.
 - a. In Texas, the basic standard for the maximum acceptable population deviation for state legislative districts: the combined deviation of the most populous district and the least populous district from the ideal district population may not exceed 10 percent, and all the other district populations must fall within that narrow range. (*White v. Regester*, 412 U.S. 755 (1973))
2. Second, districts must be drawn in a manner that neither has the purpose nor will have the effect of denying or abridging the right to vote on the basis of race, color, or language group. These requirements are based in the Fourteenth Amendment to the U.S. Constitution (the Equal Protection Clause), the Fifteenth Amendment (prohibiting voting discrimination based on race), the federal Voting Rights Act of 1965, and, for congressional districts, Section 2, Article I, of the U.S. Constitution.

State Senate District Requirements

Section 25, Article III, Texas Constitution, requires the Texas Senate to be elected from single-member districts and each senate district to be composed of **contiguous territory**.

Section 28, Article III, Texas Constitution, requires the legislature to redistrict state senate districts during the first regular session following publication of the decennial census. If the legislature fails to do so, the redistricting task falls temporarily to the Legislative Redistricting Board.

State House District Requirements

Often referred to as the "county line rule," Section 26, Article III, Texas Constitution, as modified by the federal courts to comply with the one-person, one-vote standard mandated by the Fourteenth Amendment, requires that house districts be apportioned among the counties according to the most recent federal decennial census population, subject to the following:

- a county with sufficient population for exactly one district must be formed into a single district;
- a county with a population smaller than the population needed for a whole district must be kept whole and combined with one or more contiguous counties to form a district;
- a county that has sufficient population for two or more whole districts must be divided into that number of districts, with no district extending into another county; and
- each county with a population sufficient for one or more whole districts plus a fraction of another district must be divided into that many whole districts, with the excess population added to one or more contiguous counties to form an additional district.

In practice, it is sometimes impossible to draw a statewide plan that completely satisfies these rules while maintaining districts with equal populations. The Texas courts have allowed a house plan to violate the county line rule to the limited extent necessary to draw a plan that complies with the federal one-person, one-vote requirement. For example, a county with less than the population

needed for a single house district may be split between districts when no other option is available to create equally populated house districts.

Section 28, Article III, Texas Constitution, requires the legislature to redistrict state house districts during the first regular session following publication of the decennial census. If the legislature fails to do so, the redistricting task falls temporarily to the Legislative Redistricting Board.

Congressional District Requirements

The number of seats in the U.S. House of Representatives apportioned to each state is determined after each decennial census by a mathematical formula set by federal law. Unless a state's constitution provides otherwise, each legislature has the authority to draw its state's congressional district boundaries. No Texas constitutional or statutory provisions address congressional redistricting. As a practical matter, the legislature must draw districts for the congressional seats apportioned to Texas before the candidates' filing period for the first general election following the decennial census. Unlike legislative redistricting, congressional redistricting does not come within the authority of the Legislative Redistricting Board if the legislature fails to enact a valid plan during the regular session that is meeting when the decennial census is published. ***The issue may be taken up in a subsequent special session of the legislature*** or, if the legislature fails to enact a congressional plan or if the governor does not call a special session, the districts may ultimately be drawn by a state or federal district court.

Federal law allows substantially less population deviation for congressional districts than for legislative districts, requiring congressional districts to be as equal in population as practicable. In congressional districts, each deviation from the ideal district size must be justified on the basis of a rational state policy or be found to be unavoidable despite a good faith effort to draw districts with equal population (*Karcher v. Daggett*, 462 U.S. 725 (1983)). As a result, congressional districts are usually drawn to be almost exactly the same in population.

State Judicial District Requirements

Texas law states that the purpose of reapportionment of the State's judicial districts for the district courts is to promote "prompt and efficient" administration of government by equalizing the "judicial burdens" of the district courts (Section 24.941, Government Code). This differs from the purpose of redistricting representative districts, which is to equalize the populations of the districts. Caseloads and a number of other variables, some of which are difficult to quantify, may be factored into the measurement of "judicial burden." Judicial districts are not covered by the one-person, one-vote requirement and may have whatever populations the legislature considers appropriate.

The Texas Legislature may revise the judicial districts at any regular or special session. The Texas Constitution requires the Judicial Districts Board (JDB) to make a statewide reapportionment of judicial districts if the legislature does not do so by June of the third year following the federal decennial census. If the JDB fails to do so by August of that third year, the responsibility falls to the Legislative Redistricting Board.

The boundaries of the state's courts of appeals districts are determined solely by the legislature and are not required to be redrawn at any particular time.

U.S. Congressional Apportionment

The federal constitution calls for reapportionment of congressional seats according to population from a decennial census (Section 2, Article I). Reapportionment is the allocation of a set number of districts among established units of government. The 435 congressional seats are reapportioned among the 50 states after each decennial census according to the method of equal proportions.

On April 26, 2021, the United States Census Bureau reported results of congressional reapportionment from the 2020 Census. According to these results, Texas will add two new congressional districts for a total of 38 seats in the U.S. House of Representatives for the 118th Congress.

Ideal Population

One of the primary requirements governing redistricting is that districts of a given type must have equal or nearly equal populations. Ideal district population is the population a district would have if all districts in a plan have equal populations, and it is determined by dividing the total state population by the number of districts in the plan. Along with the congressional apportionment results, the U.S. Census Bureau reported the total resident population of each state from the 2020 Census. The population of Texas increased by 3,999,944 or 15.9% since the 2010 Census for a total of 29,145,505. The detailed population data for small areas needed for redistricting are was released by August 16, 2021, but the ideal district population for each plan type (state senate, state house, congressional, and SBOE) can be determined with the total state population.

	2020/(2025?)		2010	
	Districts	Ideal Population	Districts	Ideal Population
Texas:		29,145,505		25,145,561
State Senate	31	940,178	31	811,147
State House	150	194,303	150	167,367
U.S. Congress	38	766,987	36	698,488
SBOE	15	1,943,034	15	1,676,371

Redistricting Maps – The Science

Redistricting legislation follows the same path through the legislature as other bills, and testimony on the process and on specific proposals may be provided during scheduled public hearings. Visit the House and Senate redistricting committee websites for committee contact information and additional options to submit public input. The notices of some public hearings may also include options to provide input without registering to testify during a hearing.

Members of the public can submit redistricting map proposals created in most redistricting applications for state senate, state house, congressional, and State Board of Education (SBOE) districts to the Texas Legislative Council's redistricting office for publication to the DistrictViewer and Capitol Data Portal websites. The submitted proposals will also be made available in the legislature's redistricting software, RedAppl. Plans submitted to the council in this manner become available to the House and Senate redistricting committees, other members of the legislature, and the general public. See Redistricting Proposals from the Public for information about submitting a public redistricting proposal.

Resources provided by the legislature to support and provide information about the redistricting process in Texas include **DistrictViewer**, **RedAppl**, the **Capitol Data Portal**, and this website, which provides current redistricting news, discussions on legal issues about the topic, historical information, and links to other useful sites.

DistrictViewer is a website that displays detailed maps and provides associated demographic and election reports for current and proposed state senate, state house, congressional, and SBOE districts. Individuals can reference **DistrictViewer** during committee and floor debate to quickly view the map and statistics about individual districts within a proposal, overlay boundaries from an amendment or current district plan to compare differences, see how district boundaries relate to city and voting precinct boundaries, search for an address, and easily access additional data and resources related to any available plan. All redistricting proposals that are made public through the legislative process, such as by the filing of a redistricting bill or the offer of an amendment in committee or during floor consideration of a redistricting bill, are made available in **DistrictViewer**. See the **DistrictViewer** Guide to learn about the available features.

RedAppl is the redistricting application created for the Texas Legislature; it provides access to population and election data and allows district proposals to be drawn. While **RedAppl** is intended for use by the legislature during periods of legislative redistricting activity, access to **RedAppl** is also made available to interested members of the public through a remote connection to the application on an appointment basis. Interested persons should view the **RedAppl** training video available on YouTube to determine if **RedAppl** access will enhance their ability to participate in the process and then review the public access policies and procedures for more information about establishing a **RedAppl** account, scheduling appointments, and using **RedAppl** to develop proposals for public input to the legislature.

The **Capitol Data Portal** is a website that provides public access to the geographic, election, and population datasets that are available within **RedAppl**; it also provides geographic data and other resources related to each redistricting proposal made public throughout the legislative process. The election and geographic data available on this site are developed specifically for redistricting in Texas and may be downloaded for use in any compatible redistricting or GIS application.

GERRYMANDERING – THE BASICS

Mathematical algorithm models are used to determine map boundaries within States in regard to defining voting districts (electoral constituency).

The process of defining voting district map boundaries is affected by the **Voting Rights Act of 1965 as amended** (52 U.S.C. Sec 10102-10702 Voting and Elections; Pub. Law 89-110; 79 Stat. 437) which is a federal law to not only enforce the 15th Amendment to the U.S. Constitution , which prohibits the denial of the right to vote based on race or color, but also designed to eliminate discrimination in the voting registration and voting process. The Act is considered a monumental achievement in the fight for civil rights and ensures equal access to the ballot box for all American citizens. A petitioner can claim violation of the Act if there are accusations of discriminatory or unfair voting district map boundaries, whether created intentionally or unintentionally by gerrymandering or inherently discriminatory.

The objective of such map boundaries, since the United States uses a republic form of government (where voting district elected representatives represent the interests of the citizens they represent) is to be fair and not discriminatory such that relevant interest groups (be they a political party affiliation, race or other ethnic distinction) are fairly representative by the government representatives they vote for (be they local, state or federal representatives).

There are a lot of legitimate reasons why some districts are not simply drawn, uniform and compact: In many states, district maps are supposed to try to preserve natural boundaries such as rivers and county lines as well as “communities of interest,” and they must also comply with the Voting Rights Act’s protections for racial minorities. These requirements can lead to strange-looking voting district map boundaries — and can give cartographers latitude to gerrymander under the cover of satisfying these other constraints.

Even though there is no perfect and fully accurate way to draw voting district map boundaries (any will have some aspect of an inherent partisan effect), the complex voting district boundary mathematical models used to determine map boundaries are at risk of being unfairly manipulated by the folks entering data and running the models (the devil is in the detail). That is why independent, objective and fairly minded voting Redistricting Commissions are necessary when voting district map boundaries are determined – and hence a need to avoid or at least minimize *gerrymandering*.

Gerrymandering – the term used to describe the unfair manipulation of the map boundaries of (an electoral constituency) so as to unfairly favor one party or class to achieve partisan gain. Voters should choose their elected officials, rather than elected officials choosing their voters.

The cases from Texas are perhaps the most well-known chapter in redistricting since Massachusetts legislators drew a map in 1812 that led to the birth of the term "gerrymandering." In that infamous episode, mapmakers aligned with Massachusetts Governor Elbridge Gerry drew a state Senate plan to help elect Gerry partisans. A clever newspaper editor dubbed the plan a "Gerrymander" saying that the contorted districts resembled a salamander, and coined

a new term to describe the art of drawing electoral districts to favor one group over another. (See Appendix for more detail about Gerrymandering).

Gerrymanderers rig maps by “**packing**” and “**cracking**” their opponents. In **packing**, you cram many of the opposing party’s supporters into a handful of districts, where they’ll win by a much larger margin than they need. In **cracking**, you spread your opponent’s remaining supporters across many districts, where they won’t muster enough votes to win.

In 1986 the U.S. Supreme Court ruled extreme partisan gerrymanders unconstitutional (*Davis v. Bandemer*, 478 U.S. 1-9 (1986)) but failed to agree on a clear standard for the judicial review of the claims of a political nature to which such cases belong. They just don’t know how to decide what shapes are too bad. Thus mathematicians¹ and their statistical math modeling are essential experts needed to argue whether voting district boundaries have been gerrymandered or not. Courts have generally ruled gerrymandering has not occurred so a tough battle for those desiring to fight the issue (either cases don’t have merit or the petitioners don’t have standing² to bring an action).

Texas does not need legal justification to craft new maps in the middle of the decade. Governor Abbott is relying on a Department of Justice complaint that some of Texas voting districts violated racial equality laws, districts previously established by Republican led districting commission.

A scholarly and objective article written by independent and objective mathematicians (Mike Orcutt, ***How Math Has Changed the Shape of Gerrymandering***, Quanta Magazine, June 1, 2023)³, argues use of the following mathematical techniques described in the article how mathematicians

¹ For example, the **Data and Democracy Lab** (formerly MGGG Redistricting Lab) is a research group at the [Brooks School of Public Policy](#) at Cornell University, led by PI Moon Duchin, that grew out of an informal research collective called the Metric Geometry and Gerrymandering Group. From 2018-2024, the Lab was based in the [Tisch College of Civic Life](#) at Tufts University. Together with our close collaborators, we have expertise and interests spanning mathematics (geometry, topology, discrete math, dynamics), algorithms, software development, geography, science studies, law, and policy. We research data science interventions – better mechanisms, better models, better metrics – for democracy.

Our goals are these:

- to pursue cutting-edge **research** in the basic science and practically relevant applications of geometry, topology, and computing to the design of democratic mechanisms, including but not limited to redistricting and ranked choice voting;
- to build open-source **tools and resources** that create public access and analytical power for better understanding election systems and their consequences;
- to partner with **civil rights** organizations to reexamine and strengthen the quantitative toolkit for protecting voting rights;
- to offer formal and informal expert **consulting** to stakeholders on all sides.

² For a plaintiff to bring a case in federal court, she must have standing, which requires showing three elements, one of which is "injury in fact." To show injury in fact, a plaintiff must show that she has suffered "invasion of a legally protected interest" that is "concrete and particularized." In this case, the Court found that the plaintiffs alleged but did not prove individual harms, providing evidence instead only of statewide harms of alleged partisan gerrymandering.

³ Companion articles include: Patrick Honner, **The Math Behind Gerrymandering and Wasted Votes**, Quanta Magazine, (2017); Erica Klarreich, **How to Quantify (and Fight) Gerrymandering**, Quanta Magazine, (2017)).

are developing increasingly powerful and objective statistical methods for finding gerrymanders, the impact of which can eliminate or at least minimize the presence of gerrymandering:

- The classical way to determine boundaries is to use a technique referred to as “**seed and grow**”, but because of large possibilities, there can be inherent manipulations (whether intentional or not);
- The “**seed and grow**” technique can be much improved by applying the “**Markov chain Monte Carlo or MCMC**” graphing technique to make maps (similar to the 2014 “**flip-based**” technique) and supplementing the **MCMC** technique with the **Perron-Frobenius theorem** (which will result in a long enough analysis interval called the “**mixing time**”) which then ideally results in sufficient statistical sampling analyses to provide an objective (best fairness or least partisan) map boundary;
- The somewhat costly **MCMC** technique can be improved by applying the (faster and presumptively more efficient) **ReCom** technique that works by randomly selecting districts and merging them to create a single unit creating a **spanning tree graph** and better objective voting district map boundaries.
- Some mathematicians claim the **MCMC and ReCom** techniques are not as efficient as the “**sequential Monte Carlo or SMC**” technique
- Use the “**efficiency gap**” analysis to assess gerrymandering.

A challenge for any map boundary making process is that if you have a whole lot of districts where the result is really close to 50%, then a very small change (similar to chaos theory) in the fraction of the vote share could make a very big change⁴ in the fraction of the seat share. This circumstance is ripe for the risk of gerrymandering to occur.

Computational redistricting effectively replaces the comparatively straightforward question of whether a single map is fair with the seemingly far more complicated one of whether millions of statistically analyzed maps are fair. This places it squarely in the mathematical tradition of showing that a simple problem is equivalent to a far more complicated one and then solving the more complicated problem. Thus balancing elegant simplicity with intellectual complexity. In the case of restricting maps, the simple and the complex or inextricably linked. – and the devil is in the detail no matter who is piloting the process.

Techniques used to determine partisan symmetry (fairly drawn map boundaries to avoid gerrymandering) include:

- A simple measure of partisan symmetry, called the “**efficiency gap**,” which tries to capture just what it is that gerrymandering does. At its core, gerrymandering is about wasting your opponent’s votes: **packing** them where they aren’t needed and **spreading (or cracking)** them where they can’t win. The **efficiency gap** calculates the difference between each party’s

⁴ Small change and big effect is similarly associated with chaos in physics dealing with resonance (where a the frequency of a force applied to a system is the same as the natural frequency of the system); when a small change in the force frequency occurs when the force frequency is close to the natural frequency, differential equation graphical analysis will illustrate chaotic out of control behaviour which is different each time the same analysis is performed.

wasted votes, as a percentage of the total vote — where a vote is considered wasted if it is in a losing district or if it exceeds the 50 percent threshold needed in a winning district;

- A suggested five-pronged gerrymandering test:
 1. evidence of partisan bias,
 2. indications that the bias would likely endure for the whole decade,
 3. the existence of at least one replacement plan that would remedy the existing plan's bias,
 4. simulations showing that the plan is an extreme outlier, suggesting that the gerrymander was intentional, and
 5. evidence that the people who made the map knew they were drawing a much more biased plan than necessary.
- Collaboration between political and social scientists, mathematicians, and computer scientists is the ideal way forward.
- Commercial redistricting organizations that touch on gerrymandering include:
 1. **Formerly Tufts Metric Geometry and Gerrymandering Group (now Data and Democracy Lab)** (formerly MGGG Redistricting Lab) is a research group at the [Brooks School of Public Policy](#) at Cornell University); Their mission is to study applications of geometry and computing to U.S. redistricting.
 2. **PlanScore**- PlanScore presents the most comprehensive historical dataset of partisan gerrymandering ever assembled. They also provide tools for policymakers and litigators to transparently score new plans and assess their fairness.

Texas Supreme Court Cases Regarding Gerrymandering:

In re Khanoyan, 637 S.W.3d 762 (Tex. 2022);

- Courts have limited authority to intervene in ongoing elections; disputing a redistricting action a party must show the necessity for parties to explain the practical consequences and potential disruptions to the election process of requested judicial actions; court can assess if a commissioner's court manipulated its discretion when setting district boundaries in partisan favor; need concrete and justiciable dispute; but for a court to resolve an election dispute, the court must receive the case early enough to order relief that would not disrupt the larger election....

Honors Acad., Inc. v. Tex. Educ. Agency, 555 S.W.3d 54 (Tex. 2018),

- The Supreme Court has also found exceptions to the state's broad powers where their exercise clashed with important federal interests. See *Gomillion v. Lightfoot*, 364 U.S. 339, 341, 81 S.Ct. 125, 5 L.Ed.2d 110 (1960) (recognizing Fifteenth Amendment claim for gerrymandering city boundaries to exclude African-American citizens); *Bd. of Educ. of Kiryas Joel Village Sch. Dist. v. Grumet*, 512 U.S. 687, 114 S.Ct. 2481, 129 L.Ed.2d 546 (1994) (holding unconstitutional under the Establishment Clause a New York law that carved a school district around a community of Satmar Hasidic Jews).

Andrade v. Naacp of Austin, 345 S.W.3d 1, 54 Tex. Sup. Ct. J. 1401 (Tex. 2011),

- Citing voters residing in racially gerrymandered districts have standing to sue (although voters residing outside those districts do not). *United States v. Hays*, 515 U.S. 737, 744–45, 115 S.Ct. 2431, 132 L.Ed.2d 635 (1995).

Heb Ministries v. Higher Educ. Coordinating, 235 S.W.3d 627 (Tex. 2007),

- Citing *Employment Division, Department of Human Resources of Oregon v. Smith*, 494 U.S. 872, 110 S.Ct. 1595, 108 L.Ed.2d 876 (1990) redistricting based on religious bias is illegal gerrymandering.

Neeley v. West Orange-Cove, 176 S.W.3d 746 (Tex. 2005),

- Citing *Davis v. Bandemer*, 478 U.S. 109, 106 S.Ct. 2797, 92 L.Ed.2d 85 (1986), political gerrymandering claims present a nonjusticiable political question in regard to the Equal Protection Clause of the Constitution. A threshold showing of discriminatory vote dilution is required for a prima facie case of an equal protection violation. Racial gerrymandering claims are justiciable because of the greater warrant the Equal Protection Clause gives the federal courts to intervene for protection against racial discrimination, and because of the stronger nexus between individual rights and group interests that is present in the case of a discrete and insular racial group.

Gonzales v. Concerned Citizens, 173 S.W.3d 112 (Tex. 2005),

- "gerrymandering" of boundaries did not render an incorporation election void. See *City of Gladewater v. Pelfrey*, 309 S.W.2d 472, 473 (Tex.Civ.App.-Texarkana 1957, writ ref'd n.r.e.).

Perry v. Del Rio, 67 S.W.3d 85 (Tex. 2001),

- Citing *Hunt v. Cromartie*, 526 U.S. 541, 551, 119 S.Ct. 1545, 143 L.Ed.2d 731 (1999) ("Our prior decisions have made clear that a jurisdiction may engage in constitutional political gerrymandering, even if it so happens that the most loyal Democrats happen to be black Democrats and even if the State were conscious of that fact." (emphasis in original)).
- Constitutional political gerrymandering refers to the practice of drawing electoral district boundaries to favor one political party over another, potentially violating constitutional principles of fairness and equal representation. While the Supreme Court has deemed partisan gerrymandering claims to be non-justiciable in federal courts, meaning they cannot be reviewed or decided by federal judges, some state constitutions and state courts are actively addressing these issues.

State v. Stein, 26 S.W.2d 182 (Tex. 1930),

- Claim that a city boundary ordinance was being gerrymandered with the illegal, arbitrary, unreasonable and fraudulent purpose and effect to cause favorable vote for incorporation within said boundaries, was held nonjusticiable claim since there was essential compliance with the ordinance process of boundary setting, disconnected from voter metrics.

Texas Statute Making Reference to Gerrymandering The Texas Alcohol Beverage. Code § 11.49 (e) Premises Defined; Designation of Licensed Premises, cites that when a liquor license is under review, The commission or administrator shall adopt rules to implement this subsection and to

prevent **gerrymandering**. Thus the concept of gerrymandering is observed in Texas and in the case of liquor license issuing, the gerrymandering is not allowed (implying it is allowed in other circumstances).

Appendix 1 – Gerrymandering Detail

While not explicitly illegal everywhere, partisan gerrymandering is a legal practice in many jurisdictions, though it is often criticized for its anti-democratic nature. However, racial gerrymandering, which is drawing district lines based on race, is illegal and can be challenged in court. The Supreme Court has ruled that federal courts cannot intervene in cases of partisan gerrymandering.

Here's a more detailed breakdown:

Partisan Gerrymandering:

Legal in many places:

While it can lead to unfair representation, partisan gerrymandering (drawing district lines to favor one political party) is generally legal at the federal level and in many states.

Non-justiciable:

The Supreme Court has deemed partisan gerrymandering claims "nonjusticiable," meaning federal courts cannot hear cases challenging them.

State-level challenges:

Some states allow for challenges to partisan gerrymandering in state courts.

Examples of state-level challenges:

Some states like Alaska, Maryland, New York, and Ohio have struck down maps as unconstitutional partisan gerrymanders, while others have upheld challenged maps.

Racial Gerrymandering:

- **Illegal:** Drawing district lines based on race is a violation of the [Voting Rights Act of 1965](#) and is therefore illegal and can be challenged in court.
- **Justiciable:** Federal courts can hear cases involving racial gerrymandering.

Consequences of Partisan Gerrymandering:

- **Undermines democratic principles:**

Gerrymandering can lead to districts that are not representative of the broader electorate and can make elections less competitive.

- **Creates extreme districts:**

It can lead to the election of politicians who are more focused on their party base than on the interests of the broader community.

- **Voter disengagement:**

Gerrymandering can lead to voter frustration and disengagement from the political process.