THE GERRYMANDERING OF BLACK VOTERS IN OKLAHOMA

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ABSTRACT

Redistricting has always been a contentious issue, reaching new heights over the past few decades as the U.S. political environment has become more polarized. Oklahoma largely functions as a single-party state with Republicans controlling all federal seats, all major statewide offices, and super-majorities of both houses of the state legislature. We explore the last three redistricting efforts to understand the nature of gerrymandering in the state. More specifically, we address the question, how common is it for a districting plan to have the vote totals and racial makeup of the implemented plan? This is achieved by comparing the implemented plan to what is called the "Ensemble of Alternative Plans." This ensemble is generated using the mathematical technique of Markov Chains. We find that the implemented plan has an abnormal distribution of the Black Voting Age Population which supports a claim of intentional packing in the state's metropolitan areas.

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INTRODUCTION

In this paper we explore the last three redistricting cycles to understand the nature of gerrymandering in the Oklahoma State Legislature as it relates to the Black Voting Age Population (BVAP). We decided to focus on BVAP in the OK State Legislature for this paper. With Oklahoma's strong Republican voting on a Federal level, and the fact that there are only five congressional districts, it is difficult to draw those districts to produce any outcome other than 100% Republican representation.[2] With 101 and 48 districts respectively, the OK House and Senate allow for much more diversity in districting and therefore much more room for manipulation. The focus on BVAP was initially made because, while census data does not include respondents' political affiliation, Black voters are a more polarized bloc than any other race group, voting 87-12 for Biden in 2020 (National "Exit Poll for Presidential Results" 2020.). Thus, gerrymandering Black voters can be used as a proxy for Democratic voters. Other minorities have strong voting preferences, but not nearly as strong (e.g., 65-13 for Hispanic and 61-34 for Asian voters in 2020). Our analysis was performed on several demographics and this hypothesis is supported in the data as the gerrymandering effect, while visible in other demographics, is most clear in BVAP.[3]

In the first section, we provide context by giving a brief overview of gerrymandering. This is followed by an analysis of monumental court cases that relate to redistricting and a summary of relevant information pertaining to Oklahoma.

In the second section we discuss the methodology used to address the question: how common is it for a districting plan to have the vote totals and racial makeup of the implemented plan? Utilizing

2   This decision will be further justified in the Methodology Section.

3   Further discussed in the Findings Section

that methodology, we then present data for the House of Representatives and Senate, individually. However, findings within the Legislative Branch are consistent between the two, as will be further highlighted in the subsequent discussion and conclusion.

CONTEXT

The term "gerrymander" originated in the early 19th Century as a word-play on the name of Massachusetts Governor, Elbridge Gerry. In 1812, his administration enacted new legislation defining novel state senatorial districts that consolidated the power of the Federalists to very few districts, throwing the majority vote to Gerry's party, Democratic-Republicans. This led to some oddly shaped districts. Most notably was that of Essex County, the subject of the *Boston Gazette's* now famous salamander cartoon by Elkhana Tisdale, dubbed "Gerry-mander"(Martis 2008).

Since this time, gerrymandering in U.S. politics has referred to a practice of drawing boundaries for electoral districts that gives one party an unfair advantage over its political rivals, while maintaining districts with mostly equal populations. Gerrymandering is often most effective in that it creates wasted votes, which do not contribute to the election of a candidate. When redrawing geographic boundaries, the mapmaker will pack opposition voters into districts that the minority party should already win, therefore wasting votes, called "packing." When the voters are spread through multiple districts to dilute their power, they are being "cracked," therefore, giving the majority a bare majority, but a numerical victory in the legislative body (Parloff 2017).

In the U.S. Constitution's Article I, Section 4, state legislatures hold the primary responsibility to determine the "times, places, and manner" of congressional elections. Fourteen states delegate this responsibility to redistricting commissions while another 33 states draw lines themselves.

In 1963, the U.S. Supreme Court ruled in *Gray v. Sanders* that population equality was of utmost importance. The majority opinion, written by Justice William O. Douglas, states that "The concept of political equality can mean only one thing—one person, one vote." This is followed by the 1964 U.S. Supreme Court ruling in *Wesberry v. Sanders,* that populations of House districts must be equal "as nearly as practicable." By the 1970 Census, state legislatures had to readjust legislative and Congressional boundaries every 10 years based on the census. "Any district with more or fewer people than the average (also known as the 'ideal' population), must be specifically justified by a consistent state policy" (Levitt 2020). Justifiable reasons include compactness, contiguity, preservation of political subdivisions, preservation of communities of interest, preservation of cores of prior districts, protection of incumbents, and compliance with Section 2 of the Voting Rights Act of 1965 (VRA)[4]."Consistent policies that cause a one percent spread from largest to smallest district will likely be unconstitutional" (Levitt 2020).

DETECTING GERRYMANDERING

Numerous variables come into play when creating district maps. While some are well-defined, such as contiguity and ideal population, others are subject for debate. The prioritization of these variables when determining an ideal district plan is also in flux.

Some groups focus more on the efficiency gap, which is simply the difference between the two parties' wasted votes, divided by the total number of votes (Stephanopoulos and McGhee 2015); others consider how competitive the districts are. Often, the concept of "compactness" is also considered, but even that has multiple measures.

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4   According to US Dept. of Justice's website, Section 2 of the VRA "prohibits voting practices or procedures that discriminate on the basis of race, color, or membership in one of the language minority groups identified in Section 4(f)(2) of the Act." (US Department of Justice 2022).

Compactness, which lacks a clear legal definition, has become a means of identifying gerrymandering due to oddly shaped districts, like Gerry's salamander in Massachusetts. This is built upon the idea that if a district has a certain shape, it is less likely to have been gerrymandered. There are various notions of what shape is most ideal, yielding multiple measures of compactness. Some of these measures focus on a district's perimeter, while others compare the area of the district to the smallest circle containing that district (Barnes and Solomon 2020; Horn, Hampton, and Vandenberg 1993). Although the leading measures are simple to compute, they look at the district individually and not how they fit together. These measures often don't address unavoidable odd shapes due to natural boundaries.

PROBLEMS WITH GERRYMANDERING

Kennedy, Corriher, and Root (2019) argue gerrymandering itself is not a "sign that a particular party is corrupt: it's a flaw in our system that both major parties attempt to exploit to some degree" (pg. 9). They highlight three problems with gerrymandering. First, there is a representational mismatch. Second, gerrymandering can suppress competition and ensure incumbents keep their seats. Third, there is often a policy outcome mismatch.

Mann (2005) found that gerrymandering gives incumbents an unfair advantage. "Redistricting is a deeply political process, with incumbents actively seeking to minimize the risk to themselves (via bipartisan gerrymanders) or to gain additional seats for their party (via partisan gerrymanders)." He goes further and says gerrymandering ends up costing candidates more and increases partisanship as the districts are designed to be more polarized, perpetuating gridlock. More seats become uncompetitive as fewer candidates run against incumbents. However, Mann does note that gerrymandering is sometimes defended as the only means of securing any representation for minority groups, i.e., political, ethnic, racial, religious, linguistic, or other groups. Rather than the minority group

having a reduced chance of winning multiple districts, they opt for assured representation in one, creating "majority-minority districts." Gerrymandering, however, most often protects incumbents (Mann 2005, 4).

When redistricting is finalized, the Cook Political Report expects only around 30 to 35 competitive U.S. House seats, meaning that 94% of the US House districts are in relatively safe seats (Walters 2022). This also means the number of super-safe seats is rising as well. At the beginning of 2022, the Brennan Center for Justice found that the number of safe seats for both parties had increased (Li, Black, Miller, and Leaverton 2002). For example, the districts Donald Trump carried in 2020 by more than 15 points increased from 54 to 70, while the number of districts Biden carried by at least 15 points had increased from 20 to 23.

Daley (2016) is focused on a Republican plan called REDMAP or the "Redistricting Majority Project." This plan was created in early 2010, at a point when the country's electoral map was largely blue. As a result, Republicans gained nearly seven hundred state legislative seats in the 2010 election by investing millions of dollars in key state races, something not done before, which was the largest increase for either party in modern history. The wins were enough to flip twenty chambers from a Democratic to a Republican majority. This plan gave the G.O.P. control over both houses of the legislature in 25 states.

Today, according to Ballotpedia 23 states possess Republican trifectas where both legislative bodies and the governorship are in Republican control, while there are 14 states with Democratic trifectas, and 13 divided states. While Democrats were more likely to find "gerrymandering unethical and immoral," which has led to a stronger push toward redistricting commissions (Prokop 2022), according to a recent study in *Vox*, Democrats also gerrymander where they can, but have control of fewer states.

For more than three decades the U.S. Supreme Court has largely punted on the topic of gerrymandering, because there is not an agreed upon working standard for gerrymandered districts. Furthermore, redistricting is basically a lawmaking affair constitutionally reserved to the states. Therefore, it is said that U.S. Supreme Court intervention should be focused on only the worst violations, not mere partisan disagreements. In the next section, we detail some of the major decisions regarding the redistricting process.

JUDICIAL HISTORY OF REDISTRICTING IN THE U.S.

The Equal Protection Clause (EPC) of the 14th Amendment is the most common basis for judicial action in redistricting. In this section, we focus on judicial precedent and court cases that address gerrymandering in the redistricting process. Historically, we see three primary redistricting principles arising from the EPC that are addressed in these court cases, namely those involving equal population, partisanship, and race.

Population
While there are several Supreme Court cases that relate to the principle of equal population, four cases stand out in their importance and effect on the current redistricting process. In particular, the Supreme Court has found that the equal subdivision of the population in voting districts is important, eventually enshrining it as one of the specific "traditional redistricting principles" that must be adhered to in the redistricting process.

Baker v. Carr (1962) was the first Supreme Court case holding that the federal courts had a jurisdictional role in considering constitutional changes to state legislative redistricting plans. The U.S. Supreme Court ruled in *Wesberry v. Sanders* (1964) that the populations of House districts must be equal "as nearly as practicable." In *Reynolds v. Sims* (1964), the Supreme Court ruled that state legislatures had to readjust state legislative boundaries every 10

years based on the census. Fourth, in *Karcher v. Daggett* (1983), the Supreme Court held that congressional districts must be equal in proportion mathematically, that is unless the state can justify another legitimate state objective. The court also pointed out that states must comply with "traditional redistricting principles," i.e., preserving prior district cores, avoiding pitting incumbents against each other, compactness, and respecting municipal boundaries.

Partisanship in Redistricting

As with population, there are several redistricting cases dealing with partisanship, but a discussion of four major precedents is enlightening. First, in *Gaffney v. Cummings* (1973), the Court found that a restricting plan is not unconstitutional when it is planned to provide "political fairness" between both political parties–Republican and Democrat. In *Davis v. Bandemer* (1986), the court held that claims of partisanship in gerrymandering can be brought up to federal courts through the EPC. This case established a standard to determine whether a district is gerrymandered, but this was later found to be inadequate and struck down in the third major precedent, *Vieth v. Jubelirer* (2004). In this case, the court found that those partisan claims of gerrymandering were nonjusticiable, meaning they were not about to move forward. However, Justice Anthony Kennedy pointed to the First Amendment, instead of *Bandemer's* focus on the 14th Amendment claims. In *Gill v. Whiteford* (2018), Wisconsin's 2011 redistricting plan was invalidated by a federal court as an obvious political gerrymander. Plaintiffs claimed the redistricting plan caused their votes to be "wasted." However, it was unanimously sent back down to the appellate level, finding that the plaintiffs had not provided sufficient evidence that they had sufficient standing. Most recently, in *Rucho v. Common Cause* (2019), the Court's 5-4 majority opinion vacated and remanded the lower courts' decision to dismiss for lack of jurisdiction, stating that "partisan gerrymandering claims present questions beyond the reach of the federal courts.". (*Rucho* v. *Common Cause* 2019).

Race

In 1965, Congress passed the VRA with the goal of ending racial discrimination in voting, with added amendments over the following decades meant to strengthen the act. VRA is pivotal in shaping how the Supreme Court addresses racial issues in the redistricting process. The following describes several key precedents to understand the evolution of the Supreme Court on decisions involving redistricting regarding race.

Section 2 of the VRA requires that electoral district lines cannot be drawn in order to "improperly dilute minorities' voting power" (U.S. Department of Justice 2022). It states: "No voting qualification or prerequisite to voting, or standard, practice, or procedure shall be imposed or applied by any State or political subdivision to deny or abridge the right of any citizen of the United States to vote on account of race or color." *Thornburg v. Gingles* (1986) examined the standard for determining whether Section 2 of the VRA requires a majority-minority district be drawn. To follow the courts criteria, the justices demark three claims for a plaintiff to win: 1) the minority group must be "sufficiently numerous and compact to form a majority in a single-member district"; 2) the minority group is "politically cohesive," or vote similarly, and 3) the majority group tends to vote "as a bloc," which typically leads to the minority's candidate's loss.

In *Shaw v. Reno* (1993), the court ruled that both legislative and congressional districts can be struck down for violating the EPC if the reason for the district's boundaries cannot be explained by anything but race. In addition, "bizarrely shaped" districts were determined to be strongly indicative of racial intent. Next, in *Miller v. Johnson* (1995), the court determined that a district is unconstitutional for violating the EPC and characterized as a racial gerrymander if race is found to be "predominant" as a factor in creating the district lines.

In 1990, following the decennial census, Texas received three

more Congressional districts and redistricted by drawing lines in such a manner as to create three minority-majority districts. In *Bush v. Vera* (1996), the court found that boundaries for these three districts had race as the predominant factor. The court found that districts created to satisfy the VRA cannot subordinate traditional redistricting principles more than necessary, thus warning against using race as a proxy for partisan affiliation. Furthermore, to survive scrutiny under the EPC, a state must make a racial gerrymander reasonably compact.

Section 5 of the VRA prohibited certain states and other political subdivisions, predominantly in the former segregated southern states, from making changes to voting laws or practices without prior federal approval. In *Shelby County v. Holder* (2013), the Supreme Courts struck down Section 5 of the VRA, meaning that redistricting plans and other legislative changes in voting laws no longer required preclearance by either the U.S. District Court for the District of Columbia or the U.S. Attorney General for those affected states. Following this, in *Alabama Legislative Black Caucus v. Alabama* (2015), the court held that when a racial gerrymander is challenged, they proceed only district-by-district, and not the entire plan. Also, the EPC requiring equal population moved from a mere "factor to be considered" to a mandate. This case also struck down the Section 5 VRA requirement for a district to keep a specific minority percentage threshold to redistrict. Finally, in *Cooper v. Harris* (2017), the Court held that partisanship itself cannot be used to justify a racial gerrymander. The case builds on *Gingles* as it also finds that section 2 of the VRA, which requires racial minorities to have the opportunity to elect their "candidate of choice," but without guaranteeing a specific percentage threshold of minorities in a specific district.

OKLAHOMA

Following the 1964 U.S. District court decision to redraw several of Oklahoma's House and Senate districts in *Reynolds v. State*

Election Board (1964), the State Constitution, Article 5, Section 9A, was amended so that apportioning for the State Senate must provide consideration to the following: population, compactness, area, contiguous territory, preservation of political subdivisions, historical precedents, and other major factors to the extent feasible.[5] Oddly enough, the state constitution does not mention principles for House apportionment. As a result, the State House typically adheres to the same principles as the State Senate. Recent Oklahoma redistricting plans have required that House and Senate district populations deviate no more than 10% from the ideal population, while congressional districts must adhere to the much stricter requirement that districts may not deviate by more than 1%.

Oklahoma has 149 state legislative districts on both the State House and Senate level, and a federal delegation made up of five seats in the U.S. House (Redistricting in Oklahoma 2021). Each State House district contains roughly 39,000 Oklahomans and each state senator represents approximately 82,000 constituents (U.S. Census Bureau 2021c, hereafter USCB).

In 2018, all of Oklahoma's congressional districts favored the Republican Party. No district was viewed as competitive. The efficiency gap also favored the Republican Party by 14% (Bycoffe et al. 2018). Despite this, Democrat Kendra Horn occupied the 5th Congressional seat from 2019-2021. According to analysis by FiveThirtyEight, this gives the new 5th district a 24-pt lean toward Republicans (What Redistricting Looks Like in Every State: Oklahoma, 2022). Dave's Redistricting (2022) finds that, had the new redistricting plan been in place during the 2020 election, Trump would have won the district by 19 points instead of the actual margin of five points under the 2011 map.

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5   What is interesting here is that the US Supreme Court decision in *Reynolds v. Sims* (1964), delivered three weeks after this district court decision, would seem to imply that most of this Section is unconstitutional.

Oklahoma's state legislative districts are likely less competitive under the maps signed into law in 2021 (Oklahoma: The Sooner State 2022). Voter data, according to Dave's Redistricting (2022) affirms that the state's districts still remain largely uncompetitive. Of the state's 48 Senate Districts, 40 now lean Republican while only four lean Democrat. That leaves only four districts that remain in the 45–55% competitive range. They also found that 78 of the 101 State House Districts now lean Republican, only nine lean Democrat, and 14 fall in the 45–55% competitive range. This is one fewer competitive district than the map created 10 years before.

While the courts will not consider cases that involve partisan gerrymandering, they will consider cases that involve race. The voting age population in the state of Oklahoma over the last three redistricting cycles is broken down in the table below.

Table 1: Oklahoma Voting Age Populations by census year

	2000	2010	2020
Voting Age Population (VAP)	2,558,294	2,821,685	3,010,698
Black Voting Age Population (BVAP)	185,104	216,073	258,909
White Only Voting Age Population (WOVAP)	1,979,637	2,055,504	1,963,854
Minority Voting Age Population (MVAP)	578,657	766,181	1,046,844

It should also be noted that there are five U.S. Congressional Districts in Oklahoma. Based on the 2020 Census data, each congressional district should contain approximately 602,140 voting-age people. BVAP is only 258,909, primarily split between the Tulsa and Oklahoma City metropolitan regions. Hence, the analysis does not include the U.S. Congressional Districts.[6]

6   While some contend that record voter turnout was temporary in 2020,

METHODOLOGY

In this section we describe our methodology of analyzing the census data for the previous three election cycles as they relate to the concentration of Black Voting Age Population (BVAP) in the state of Oklahoma. We consider redistricting plans for both chambers of the state legislature. In order to accomplish this, we rely and build on work done by the Metric Geometry and Gerrymandering Group (MGGG).

The MGGG, a nonpartisan research organization studying applications of geometry and computing to U.S. redistricting, has done extensive work in the area of gerrymandering. This can most clearly be seen in their report produced for the federal court case addressing inequality in the districting map for the Virginia House of Delegates (MGGG 2018b). In this report, they measure inequality by comparing the given districting plan (partition)[7] to what they call an 'Ensemble of Valid Alternative Plans.' Utilizing this approach, we look at a representative sample of all possible partitions that could be constructed according to the rules and traditions used in Oklahoma and answer the question, how common is it for a partition to have the vote totals and racial make-up of the implemented plan? This approach can then support or refute a claim that the partition in question was chosen, not because of the necessity of following rules and traditions, but to bias a particular party or racial group. For example, (MGGG 2018b) showed that the percentage of Black, voting age population in the enacted par-

scholars actually find that voter interest appeared to be more important in influencing voter turnout, therefore, neutralizing the electoral impact of Democrats' voting by mail at higher rates during the historic pandemic (Yoder et al. 2021).

7   As the remainder of the paper focuses on the mathematical approach and interpretation, we will transition at this point to using partition in place of districting plan.

tition was significantly outside of the expected distribution, which implied that the enacted plan had been deliberately chosen to suppress black representation through packing.

MGGG produces their ensemble using a Markov Chain process. A Markov Chain (Diaconis 2009) is a sequence of partitions, each of which has been produced by making a small random change (a proposal) to the previous partition. While these changes are random, they are selected only from changes which produce valid partitions (partitions which meet the required rules and traditions of districting). While these changes are small, the chain is made long enough so that those small changes can add up to vastly different partitions. Once the chain is long enough, the members of the chain can be considered a representative sample of all possible partitions. The process used in GerryChain (the ReCom operator) has been shown to give representative results after a few thousand steps (DeFord, Duchin, and Solomon 2021).

The UCO Gerrymandering Research Group has continued to utilize and build on the resources provided by MGGG. MGGG is committed to helping others do their own analysis of districting fairness in their own areas. To support this commitment, they have taken a large amount of the data and computer code they have produced and made it available for public use. This includes the following:

- GerryChain: This is code written by MGGG which will produce an ensemble of plans to compare against using a Markov Chain (MGGG 2018a). This software has been specifically designed to be modular, which enables one to customize the metrics used to decide whether or not a partition is valid. One can also choose different proposals to start with, changing how partitions are modified to produce the next link in the chain. For the scope of this paper, we start with the enacted proposal (the given districting plan).
- MAUP: This is a set of tools that can be used to prepare geographical data for use in the GerryChain software (MGGG

2018c). For example, this includes tools for merging US Census data with state election data.

These resources have allowed us to analyze the 2001, 2011, and 2022 districting plans for the Oklahoma Legislature, while specifically looking at the racial makeup of districts.

FINDINGS

The datasets used for this analysis were created in the following manner with an identical process followed for 2000, 2010, and 2020. First, the P.L. 94-171 Redistricting Data for the decade was obtained from the U.S. Census Bureau (2021b). This dataset contains a block-by-block description of the Oklahoma population by race and by voting-age status. In this dataset, we created a total, by block, of all voting-age residents who selected "Black or African American" as their race whether alone or alongside other race/ethnicity groups. This total was designated BVAP. The dataset was then joined to the USCB TIGER/Lines Shapefile by block (USCB 2021a). Finally, the blocks were assigned to their enacted OK Legislative districts (Oklahoma State Legislature 2021) using the MAUP package from MGGG.

The resulting datasets were then analyzed using the GerryChain package from MGGG using the following settings:
- Initial state: 2001, 2011, 2022 districting plans
- Proposal: ReCom operator
- Validity Metrics:
  - Compactness (measured by cut edges): no worse than the initial partition
  - Population: No district more than 2.5% away from ideal population[8]
- Total steps: 50,000

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8   The enacted partition for 2022 deviates as much as 2.5% from the ideal population so this was used as the baseline for the ensemble.

Note that in the Proposal step, the ReCom operator forms a new partition by choosing a random pair of neighboring districts in the current step of the chain, merges them, then randomly splits them using spanning trees. Furthermore, the compactness measure ensures that each possible partition was just as compact as the implemented partition (districting plan).

After the creation of the ensemble, we begin our analysis with the distribution of BVAP in Oklahoma. For each partition of the ensemble, BVAP of its constituent districts is calculated. Within this partition, districts are sorted in descending order of BVAP. Across the entire ensemble, we compare districts with the same ordering. That is, the district with the largest BVAP in each partition is listed first, the district with the second largest BVAP is listed second, etc. For our analysis, it should be noted that while we order the districts from highest BVAP to lowest, the enacted districts in the corresponding position on each figure may not represent the same district.

OKLAHOMA HOUSE ANALYSIS

In Figures 1-3, the vertical axis measures the percentage of Black, voting-age residents in each district and the horizontal axis shows the Oklahoma House districts in terms of BVAP. All 101 House districts are included in these images. We zoom in on the largest 15 districts in terms of BVAP in order to highlight the most interesting portion of data. The box plots represent how Black voters would be distributed under the 50,000 possible partitions in the ensemble. Due to the nature of the physical distribution of Black voters in the state (concentrated in the OKC and Tulsa metro areas) it is natural that some districts have a larger number of Black voters than others, no matter how you divide them. This can be clearly seen in the box plots. The red circles, on the other hand, represent the percentage of Black, voting-age residents for the actual districts currently in use.

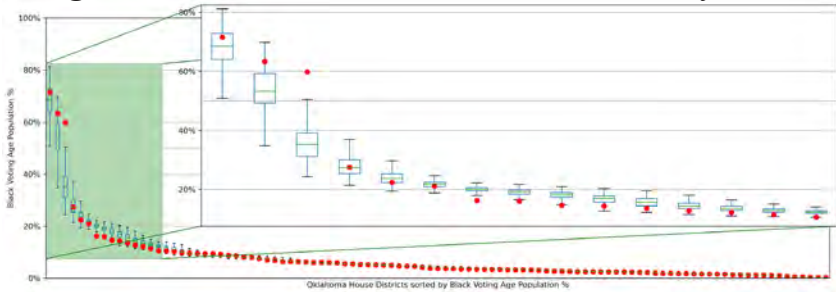**Figure 1:** 2001 Oklahoma House Districts Sorted by BVAP

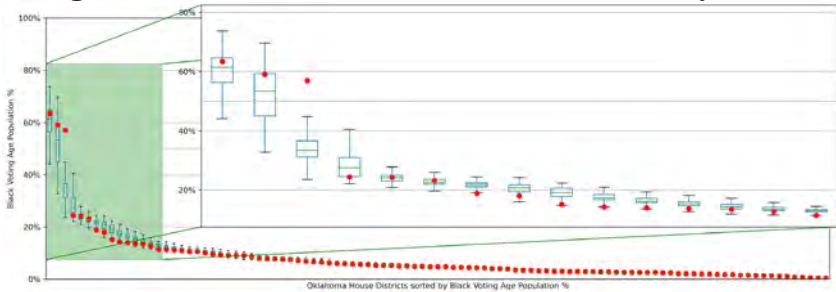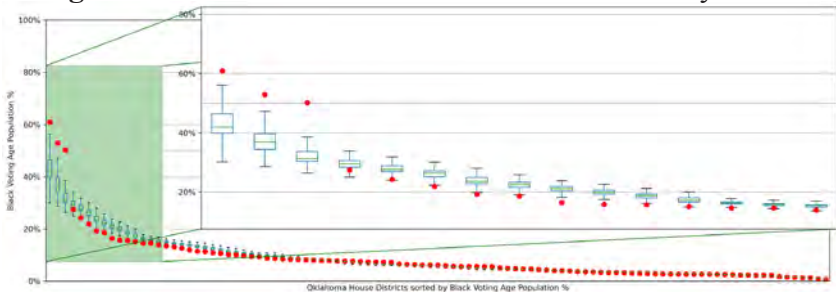**Figure 2:** 2011 Oklahoma House Districts Sorted by BVAP

Figure 3: 2022 Oklahoma House Districts Sorted by BVAP

Notice that for the three districts with the largest BVAP (far left of Figures 1-3) the actual districting plan has a BVAP far above the distribution found in the ensemble. The next four districts (from the left) have an actual BVAP that is at the very bottom of the ensemble distribution. The fact that the enacted districts are so far outside of the norm for the ensemble implies that it is unlikely

that the distribution of BVAP in the current state House districts is accidental. This is an example of packing. There is also evidence of gerrymandering in other demographics as well, though much weaker than that seen here in BVAP.[9]

When comparing the 2022 data with the 2011 and 2001 data, we see that the percentage of Black voters statewide is less geographically concentrated. This can be seen primarily through the three leftmost boxes being lower in Figure 3 than Figures 1 and 2. This is also visible in the enacted plans, as the red dots are lower. However, in 2022, the enacted districts with the highest and second highest BVAP were further outside the norm for the ensemble than they were in 2001 and 2011. That is, the amount of packing within those districts is increasing. The district with the third highest BVAP is notably outside the norm of the ensemble in all three plans and has stayed fairly consistent over time. The impact of the packing is seen on the districts that are seventh through eleventh in BVAP. They are lower than the ensemble norm. This has stayed consistent since 2001.

In addition to the box plot figures, we show a comparison between House districting maps from the Oklahoma City metro, with county lines included. The maps (Figure 4) show BVAP of districts in the Oklahoma City metro from the enacted plan and an example plan from the ensemble. The images are color coded, from dark purple, representing districts with no BVAP, to yellow, representing districts with a very high BVAP.[10]

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9   Plots for other demographics can be viewed at https://opresearch.uco.edu/gerry

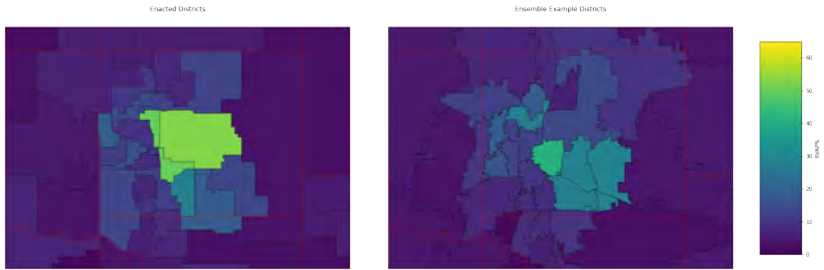10   Shading is consistent for maps of the same chamber for the same year.

Figure 4: A comparison of the 2022 House districts for OKC metro area in the enacted plan and an example from the ensemble shaded by BVAP

Note that the enacted plan has two districts with very high BVAP (bright green), but the rest of the districts have very low BVAP (purple). On the other hand, the example plan has only one district with high BVAP (green) and many districts with medium BVAP (turquoise). Although the boundary edges in the example plan appear to be more jagged, the compactness of each district is no worse than the compactness of the enacted plan with respect to the cut-edges metric. Furthermore, while the example districting plan appears to create more competitive districts, this isn't always ideal. More analysis must be done to determine the threshold for ensuring representation within a more competitive district. This leads to the question: is it better to be guaranteed two representatives or have the possibility of zero to six representatives?

OKLAHOMA SENATE ANALYSIS

We repeat the same analysis for the Oklahoma Senate as we did for the House. Figures 5-7 are set up in the same way as Figures 1-3.

Figure 5: 2001 Oklahoma Senate Districts Sorted by BVAP
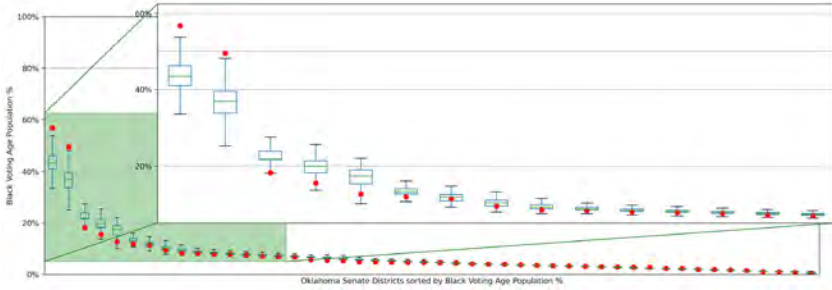
Figure 6: 2011 Oklahoma Senate Districts Sorted by BVAP

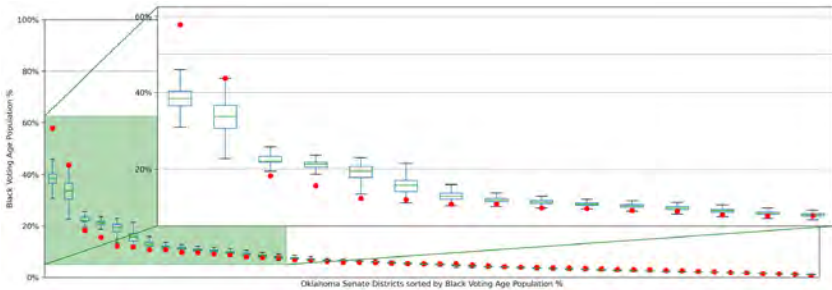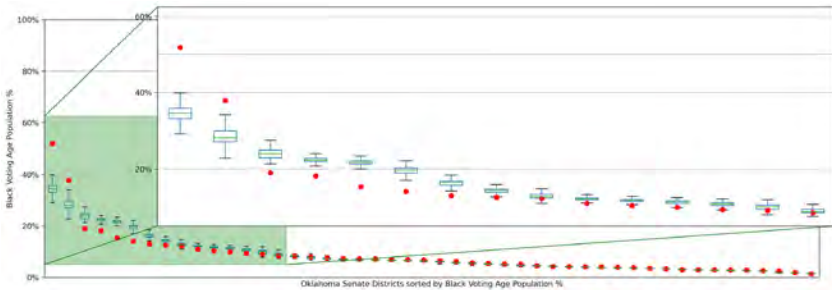**Figure 7:** 2022 Oklahoma Senate Districts Sorted by BVAP

Notice that for the two districts with the largest BVAP (far left of Figures 5-7) the actual districting plan has a BVAP far above the distribution found in the ensemble. The next four districts (from the left) have an actual BVAP that is at the very bottom of the ensemble distribution. As was the case with the House districts, the

fact that the enacted districts are so far outside of the norm for the ensemble implies that it is unlikely that the distribution of BVAP in the current state Senate districts is accidental. Once again, this presents a case for packing.

Along the same lines as the House data, we see BVAP concentration decreasing over time. In 2011 and 2022, the district with the highest BVAP was further outside the norm for the ensemble than it was in 2001. In 2022, the district with the second highest BVAP was more outside the norm for the ensemble than it was in 2001 and 2011. That is, the amount of packing in that district is increasing.

Similarly, we show a comparison between Senate districting maps from the Oklahoma City metro, with county lines included in red. The maps (Figure 8) show BVAP of districts in the Oklahoma City metro from the enacted plan and an example plan from the ensemble. The images are color coded, from dark purple, representing districts with no BVAP, to yellow, representing districts with a very high BVAP.
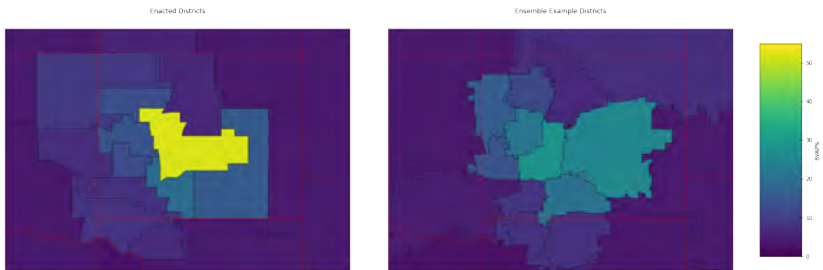

Figure 8: A comparison of the 2022 OKC metro area Senate districts for the enacted plan and an example from the ensemble shaded by BVAP

The bright green district in the enacted plan corresponds to the left-most district in Figure 7. Whereas the example plan presents a districting plan that is closer to the norm for each district. Hence,

we see more turquoise districts. Like in Figure 4, the example plan in Figure 8 appears to have more jagged edges, but once again, the compactness of each district is no worse than the compactness of the enacted plan. This, once again begs the question: is it better to be guaranteed one representative or have the possibility of zero to four representatives?

DISCUSSION/CONCLUSION

In all cases, when analyzing BVAP of districting plans for the Oklahoma State Legislature from 2001-2022, there is strong evidence of packing. Furthermore, these results are very similar to those seen in the MGGG analysis of districting in Virginia, which led to a legal battle over the validity of that plan. However, some instances of packing can lead to more guaranteed Black representation in a limited number of districts, at the expense of more competitive districts. The tradeoff for ensuring more competitive districts is that "wasted" votes in the packed districts be moved elsewhere, potentially threatening the guaranteed win. This may be justifiable under the criteria set forth by *Thornburg v. Gingles* (1986).

As Figures 1-6 indicate, BVAP has become less geographically concentrated over time. Census data shows that BVAP has increased from 7.24% of the population in 2000 to 8.6% in 2020. If legislative seats were based on racial proportionality, there would have been 7 Black representatives elected in 2001 while there would have been 9 in 2022. However, there were only 3 in 2001 and 8 in 2022. Similarly, there would have been 3 Black senators in 2001 and 4 in 2022. However, there were 2 in 2001 and 3 in 2022. Griffin (2014) notes that policy outcomes are influenced as a state becomes more diverse. Minority legislators often advocate for issues important to their respective communities. In addition, legislatures as a whole are more likely to consider these issues as the number of minority lawmakers increases.

While gerrymandering seems apparent in Oklahoma's 2022 implemented redistricting plan, the case will be hard to fight in court. On its face, the *Shelby County v. Holder* (2013) ruling undermined the ability of the U.S. Justice Department to challenge redistricting plans under charges of racial gerrymandering. Furthermore, *Cooper v. Harris* (2017) supports a challenge based on racial gerrymandering, but *Rucho v. Common Cause* (2019) shows partisan gerrymandering can be used as a substitute for racial gerrymandering.

The Brennan Center for Justice (2022) found that as of early May 2022, 70 cases have been filed challenging redistricting processes in 24 states as racial gerrymanders. State courts have ordered the redrawing of legislative maps in six states - Alaska, Kansas, Maryland, New York, North Carolina, and Ohio. In each of these states, supreme courts found that their legislative redistricting process violated their respective state constitutions. A subset of these were in violation due to racial discrimination.

In conclusion, we find mathematical evidence that the distribution of BVAP in the Oklahoma State Legislature's districts has been manipulated away from the expected mean. This presents a case of packing in the state's metropolitan areas.

REFERENCES

Alabama Legislative Black Caucus v. Alabama, No. 13-895, 575 U.S. ___, 135 S. Ct. 1257 (2015)

Baker v. Carr, 369 U.S. 186 (1962)

Barnes, Richard and Justin Solomon. 2020. "Gerrymandering and Compactness: Implementation Flexibility and Abuse." Political Analysis 29 (4): 448-466. doi: 10.1017/pan.2020.36

Brennan Center for Justice. 2022. "Redistricting Litigation Round Up." https://www.brennancenter.org/our-work/research-reports/redistricting-litigation-roundup-0 (May 12, 2022).

Bush v. Vera, 517 U.S. 952 (1996)

Bycoffe, Aaron, Ella Koeze, David Wasserman and Julia Wolfe. 2018. "Oklahoma - The Atlas of Redistricting." Project FiveThirtyEight. https://projects.fivethirtyeight.com/redistricting-maps/oklahoma/ (February 11, 2019).

Cooper v. Harris, No. 15-1262, 581 U.S. ___, 137 S. Ct. 1455 (2017)

Daley, David. 2016. Rat F**cked: The True Story Behind the Secret Plan to Steal America's Democracy. New York City, NY: Liveright Publishing Corporation/W.W. Norton & Company.

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

DeFord, Daryl, Moon Duchin, and Justin Solomon. 2021. "Recombination: A Family of Markov Chains for Redistricting." Harvard Data Science Review 3 (1). https://doi.org/10.1162/99608f92.eb30390f

Diaconis, Persi. 2009. "The markov chain monte carlo revolution." *Bulletin of the American Mathematical Society* 46 (2): 179-205.

Gaffney v. Cummings, 412 U.S. 735 (1973).

"GerryChain." GitHub. https://github.com/mggg/GerryChain (February 10, 2020).

Griffin, John D. 2014. "When and Why Minority Legislators Matter," *Annual Review of Political Science* 17:327-336. https://doi.org/10.1146/annurev-polisci-033011-205028

Horn, David, Charles Hampton, and Anthony Vandenberg. 1993. "Practical Application of district compactness." *Political Geography* 12 (2): 103-120.

Karcher v. Daggett, 462 U.S. 725 (1983)

Kennedy, Liz, Billy Corriher, and Danielle Root. 2019. "What is Gerrymandering and How Does It Affect Voters." In Rita Santos, Ed., Gerrymandering and Voting Districts. New York, NY: Greenhaven Publishing.

Levitt, Justin. 2020. "All About Redistricting," Loyola Law School. http://redistricting.lls.edu/where.php (May 13, 2022).

Li, Michael, Harry Isaiah Black, Peter Miller, and Chris Leaverton. 2002. "Redistricting: A Mid-Cycle Assessment." Brennan Center for Justice. https://www.brennancenter.org/our-work/research-reports/redistricting-mid-cycle-assessment (April 14, 2022).

Mann, Thomas E. 2005. "Redistricting Reform." The Brookings Institution: The National Voter: 4-7. http://www.brookings.edu/research/articles/2005/06/01politics-mann (February 28, 2022).

Martis, Kenneth C. 2008. "The Original Gerrymander," *Political Geograph*y 27 (4): 833–839.

Metric Geometry and Gerrymandering Group. 2018. GerryChain. GitHub. https://github.com/mggg/GerryChain (February 10, 2020).

Metric Geometry and Gerrymandering Group. 2018. "Comparison of Districting Plans for the Virginia House of Delegates." https://mggg.org/VA-report.pdf (May 13, 2022).

Metric Geometry and Gerrymandering Group. 2018. MAUP. GitHub. https://github.com/mggg/maup (February 10, 2020).

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

National "Exit Poll for Presidential Results." 2020. CBS News. https://www.cbsnews.com/elections/2020/united-states/president/exit-poll/ (June 22, 2022).

"Oklahoma: The Sooner State." 2022. Dave's Redistricting APP. https://davesredistricting.org/maps#state::OK   (April   12, 2022).

OK. State Const. art V, §9A.

Oklahoma State Legislature. 2021. "House of Representatives: District Maps and Reports (2022 - 2030)." https://www.okhouse.gov/Publications/GISDistrictMapsReports2.aspx (May 12, 2022).

Parloff, Roger. 2017. "Packing and cracking: The Supreme Court takes up partisan gerrymandering." https://www.yahoo.com/news/ packing-cracking-supreme-court-takes-partisan-gerrymandering-090050994.html?_tsrc=jtc_news_index (February 8, 2019).

Prokop, Andrew. 2022. "How Democrats learned to stop worrying and love the gerrymander: Republicans tilted the House map. Democrats are clawing their way back." Vox. https://www.vox.com/22961590/redistricting-gerrymandering-house-2022-midterms, (July 7, 2022).

"Redistricting in Oklahoma." 2021. Ballotpedia. https://ballotpedia.org/Redistricting_in_Oklahoma (January 4, 2022). *Reynolds v. Sims*, 377 U.S. 533 (1964)

Reynolds v. Sims, 377 U.S. 533 (1964)

Reynolds v. State Election Board, 233 F. Supp. 323 (W.D. Okla. 1964)

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

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

Shelby County v. Holder, No. 12-96, 570 U.S. 529 (2013)

Stephanopoulos, Nicholas and Eric McGhee. 2015. "Partisan Gerrymandering and the Efficiency Gap." University of Chicago Law Review 82 (2). https://chicagounbound.uchicago.edu/uclrev/vol82/iss2/4 (May 13, 2022).

Thornburg v. Gingles, 478 U.S. 30 (1986)

US Census Bureau. 2021. "Census Redistricting Data (P.L. 94-171) Shapefiles." https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.2020.html (May 12, 2022).

US Census Bureau. 2021. "Decennial Census P.L. 94-171 Redistricting Data." https://www.census.gov/programs-surveys/decennial-census/about/rdo.html (May 12, 2022).

U.S. Census Bureau. 2021. "QuickFacts: Oklahoma" https://www.census.gov/quickfacts/OK (May 12, 2022).

U.S. Const. amend XIV, §2.

U.S. Department of Justice. "Section 2 of the Voting Rights Act," https://www.justice.gov/crt/section-2-voting-rights-act#:~:text=Section%202%20of%20the%20Voting%20Rights%20Act%20of%201965%20prohibits,)(2)%20of%20the%20Act. (May 18, 2022).

Vieth v. Jubelirer, 541 U.S. 267 (2004)

Walters, Amy. 2022. "Enacted Maps and 2022 Ratings." The Cook Political Report. https://www.cookpolitical.com/redistricting/2022-maps-and-ratings (April 14, 2022).

Wesberry v. Sanders, 376 U.S. 1 (1964)

"What Redistricting Looks Like in Every State: Oklahoma." 2022. FiveThirtyEight. https://projects.fivethirtyeight.com/redistricting-2022-maps/oklahoma/proposal_1/ (April 12, 2022)

Yoder, Jessie, Cassandra Handan-Nader, Andrew Myers, Tobias Nowack, Daniel Thompson, Jennifer Wu, Chenoa Yorgason, and Andrew Hall. 2021."How did absentee voting affect the 2020 U.S. election?" Science Advances, (7); 52. DOI: 10.1126/sciadv.abk1755