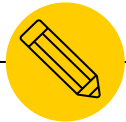


Coloring Outside the Lines

Math v. Gerrymandering in U.S. Courts



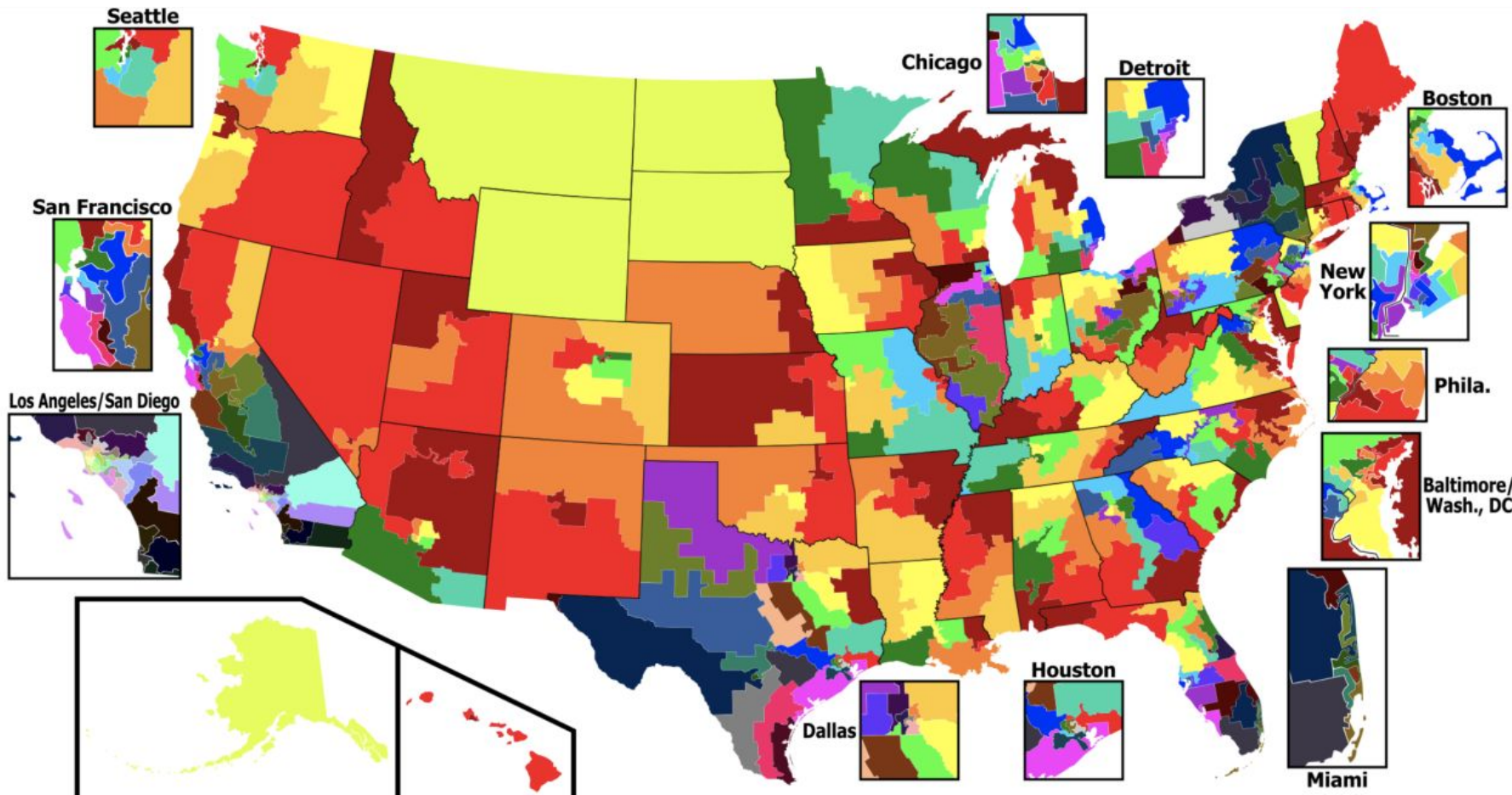
Shreya Parjan
Wellesley College '21
Institute for Mathematics & Democracy
3 Nov. 2020





Outline

- I. What is gerrymandering?
- II. What does it *look* like?
- III. *Gill v. Whitford* (2018) & the Efficiency Gap
- IV. *Rucho v. Common Cause* (2019) & MCMC
- V. Developments & What's at Stake



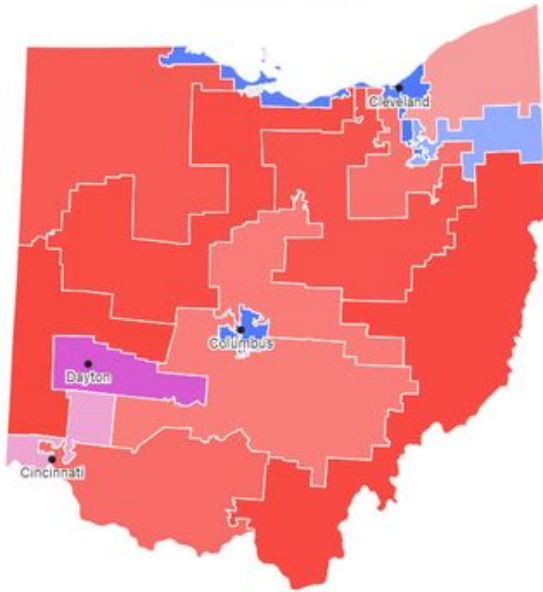


Traditional Federal Guidelines

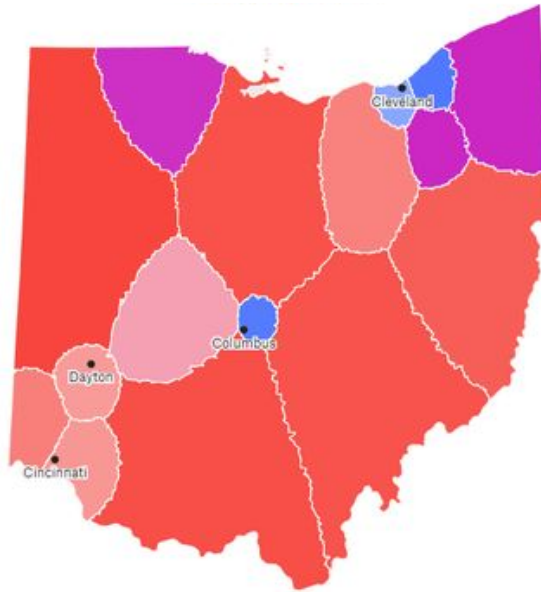
1

Compactness

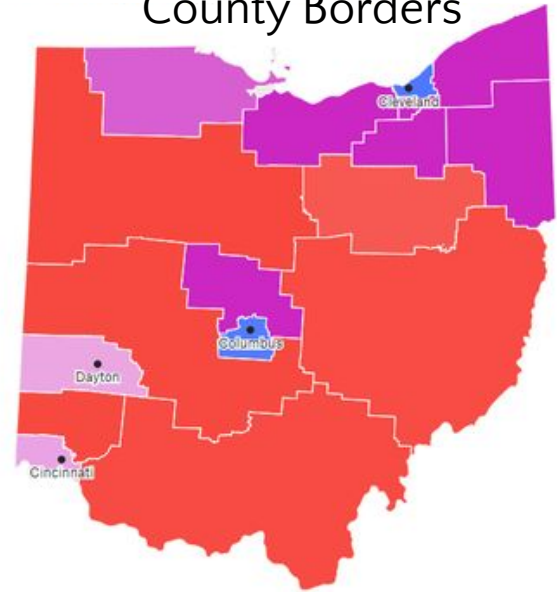
Current



Compact

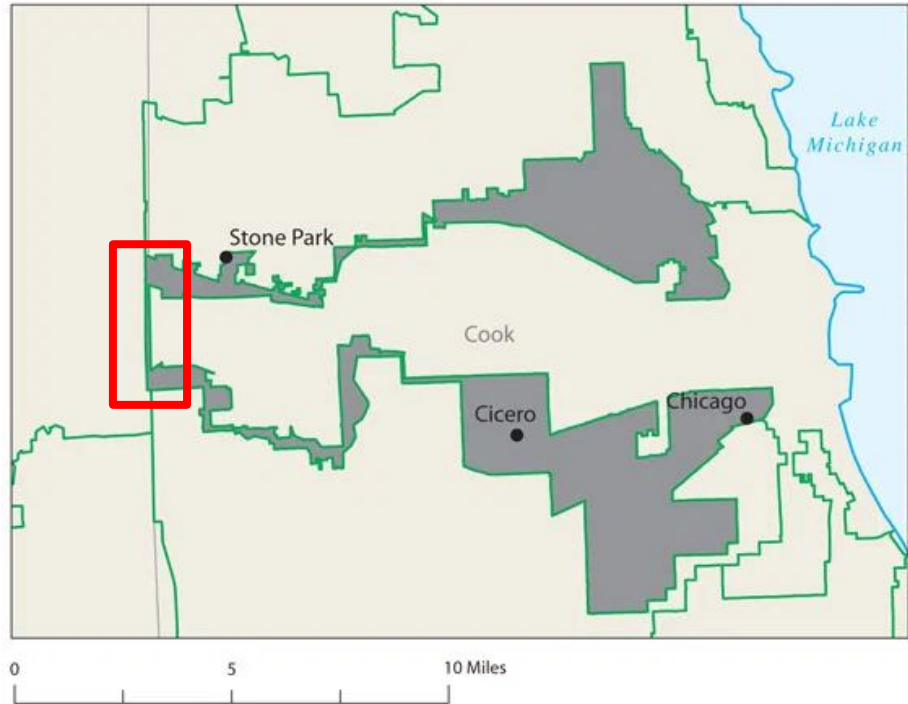


Compact,
County Borders



2

Contiguity





And...

Preservation of:

- ⦿ county borders + cities
- ⦿ “communities of interest” (this is good!)
- ⦿ cores of previous districts

Avoid:

- ⦿ pairing incumbents

Gerrymandering describes the **intentional manipulation** of district boundaries to discriminate against a group of voters on the basis of their **political views or race**.

- Brennan Center for Justice, NYU



“

What does gerrymandering look like?*

*This question is very hard to answer.

America's Most Gerrymandered Districts

Most gerrymandered Congressional districts in the U.S. according to compactness index*

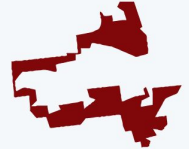
1. Maryland's 3rd district



2. Texas's 33rd district



3. Illinois's 4th district



4. Texas's 35th district



5. Louisiana's 2nd district



* ratio of the area of the district to the area of a circle with the same perimeter

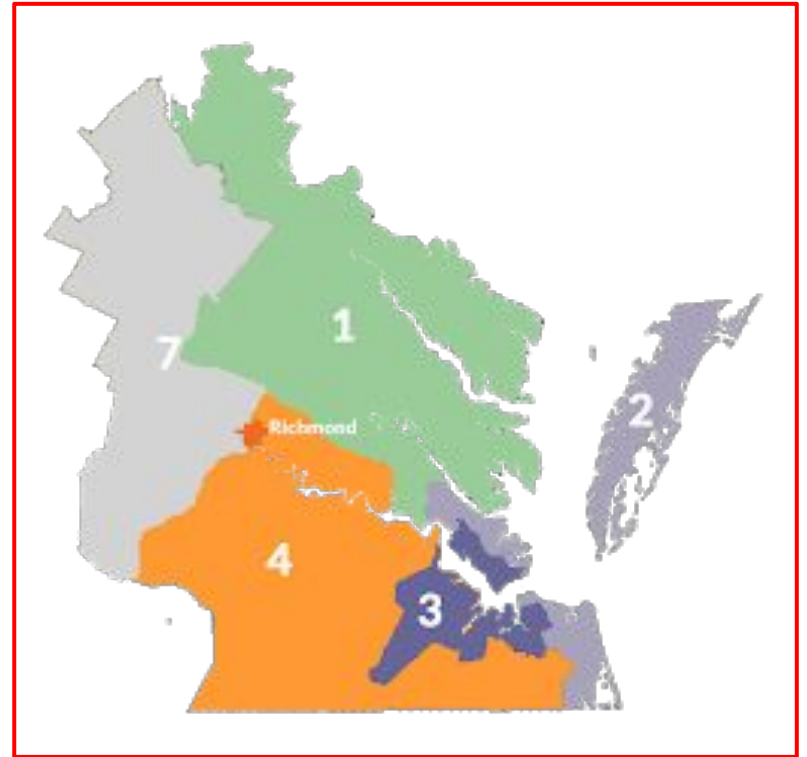
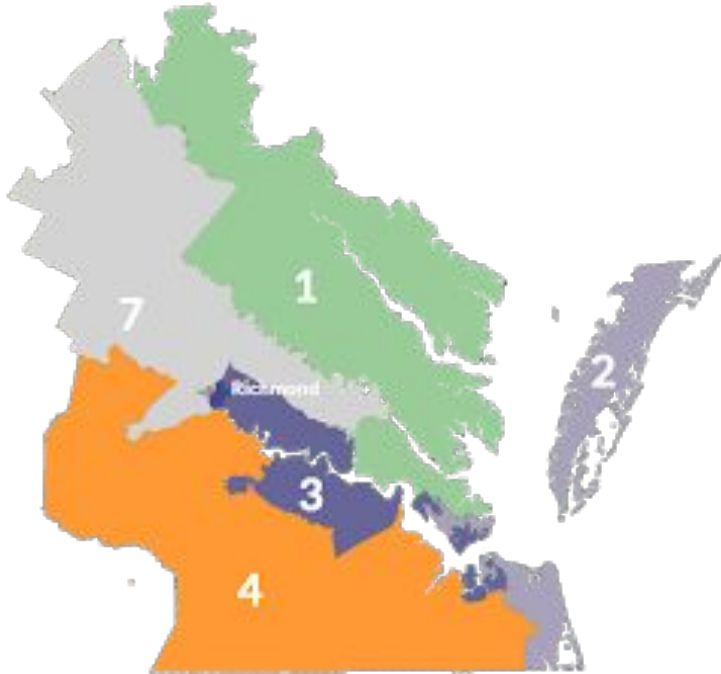
Source: Washington Post



statista

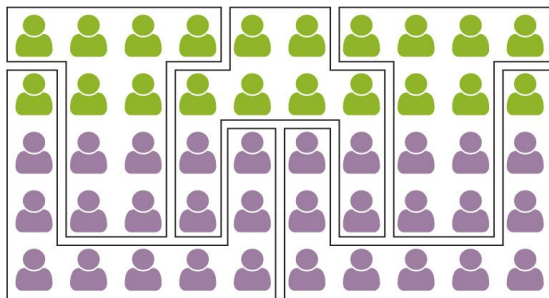


Which plan was fairer to Black candidates in 2016?

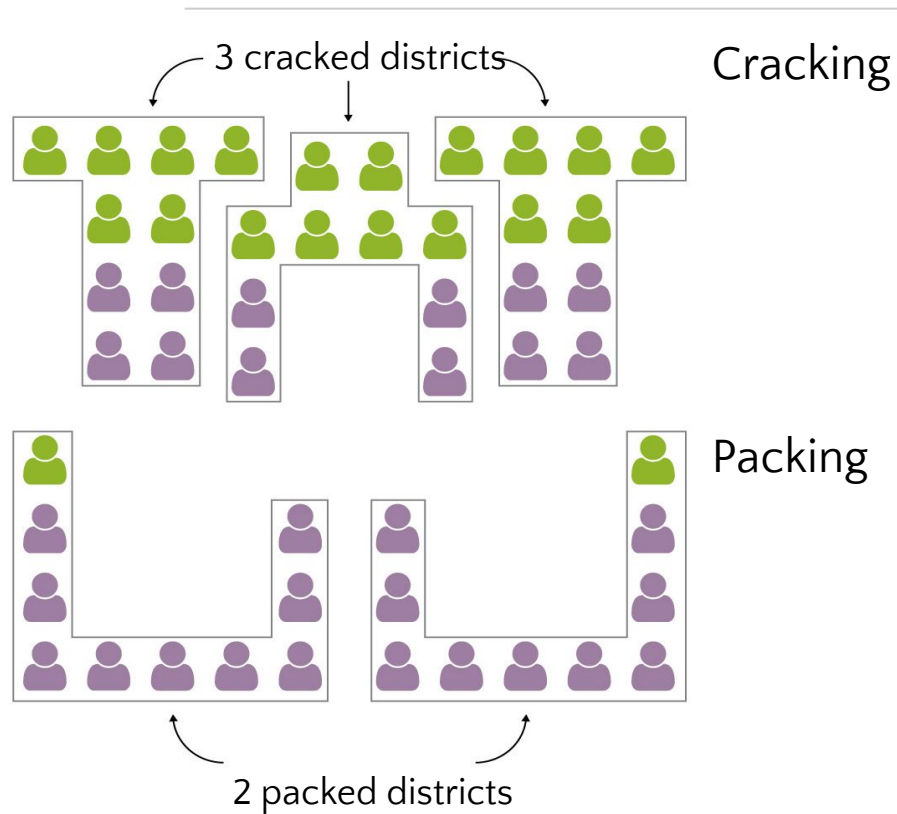




Common Strategies



20g, 30p voters





Common Strategies (cont'd)

- ◉ **Stacking**
 - group low-income minorities (perceived voting majority) with wealthy white voters with higher turnout
- ◉ **Hijacking**
 - force two incumbents to run against each other in one district so one is eliminated
- ◉ **Kidnapping**
 - move an incumbent's home address into another district where re-election can be more difficult

(Some) Compactness Scores

Polsby-Popper

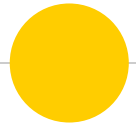


Schwartzberg



Reock



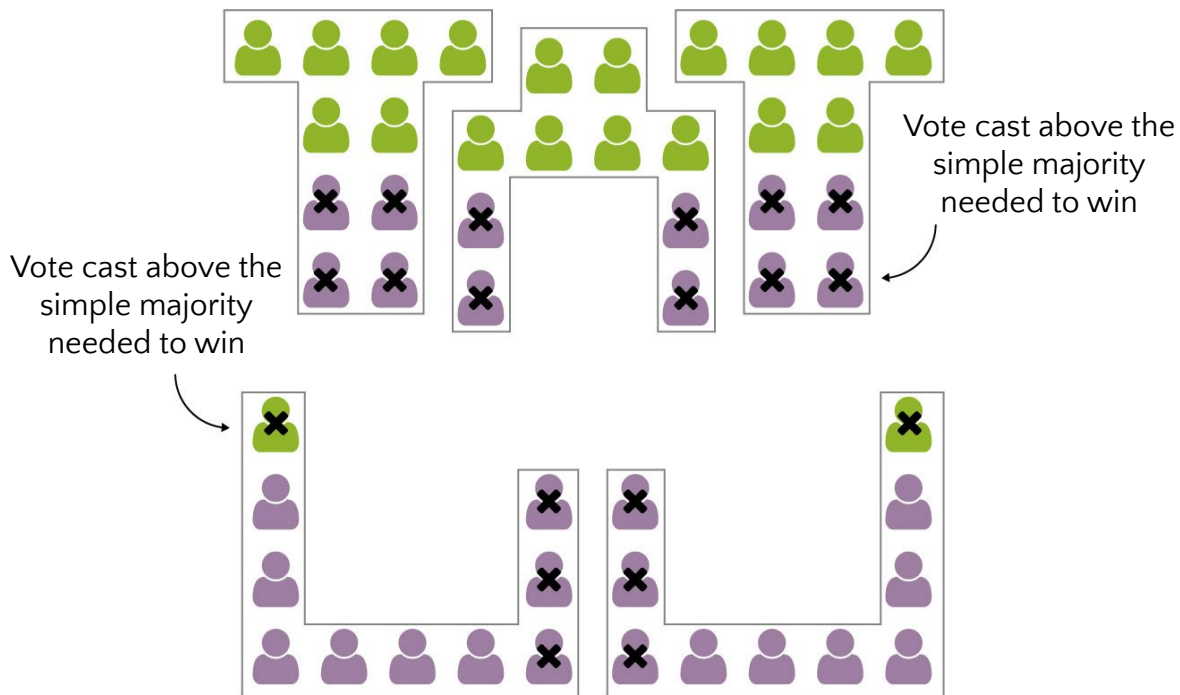


Gil v. Whitford (2018)

Efficiency Gap



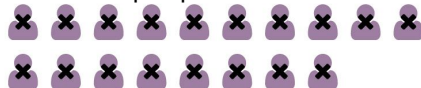
What is the efficiency gap?



Wasted green votes



Wasted purple votes



$$\frac{2-16}{100}$$

= -16%

Efficiency gap favoring green party

“Wisconsin... it’s a beauty of extreme gerrymandering”

- Wesley Pegden (CMU)

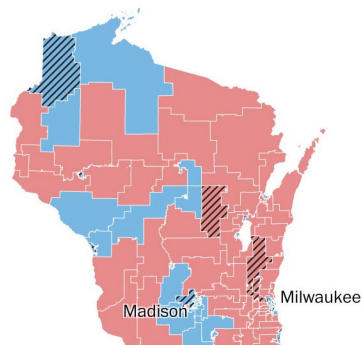


2012

-10% efficiency gap benefiting Republicans



■ Republicans won 61 seats
■ Democrats won 38 seats
▨ 23 elections were uncontested

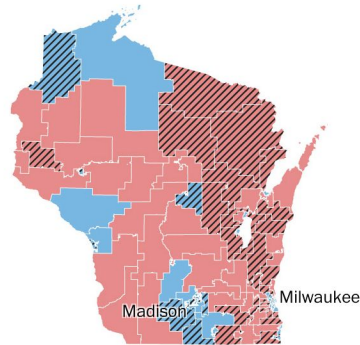


2014

-13% efficiency gap benefiting Republicans

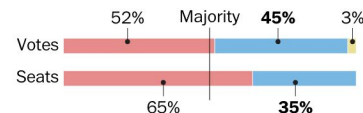


■ Republicans won 63 seats
■ Democrats won 36 seats
▨ 46 elections were uncontested

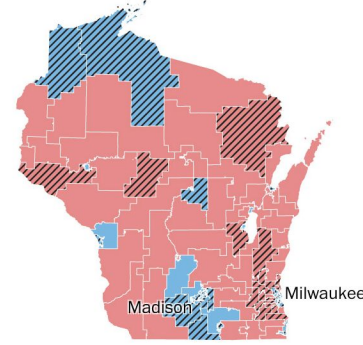


2016

-10% efficiency gap benefiting Republicans*



■ Republicans won 64 seats
■ Democrats won 35 seats
▨ 42 elections were uncontested



* Efficiency gap figure for 2016 is from an Associated Press analysis. Gaps for 2012 and 2014 were calculated by Simon Jackman.



***Gil v. Whitford* (2018)**

- ◉ WI voters (Dems) argued 2011 state legislature map was gerrymandered
 - ◉ Wanted maps with EG >7% ruled unconstitutional
- ◉ **Ruling:** Individual voters *can't* challenge a whole state's voting district map, *can* challenge their own district's map

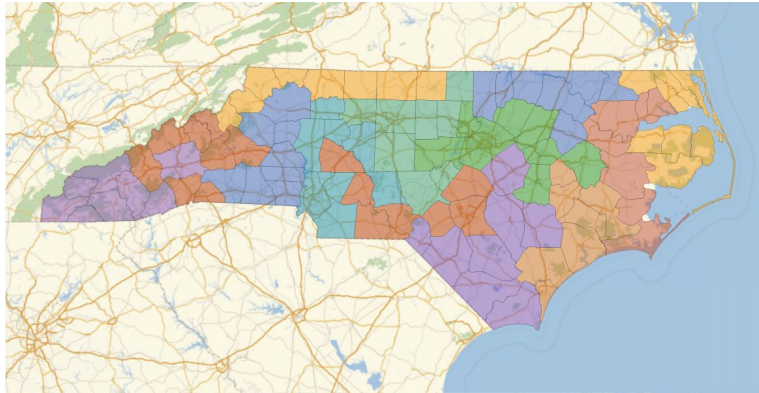
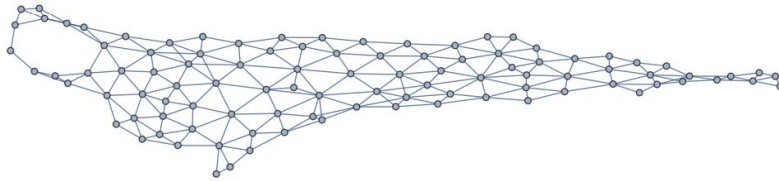


Rucho v. Common Cause (2019)

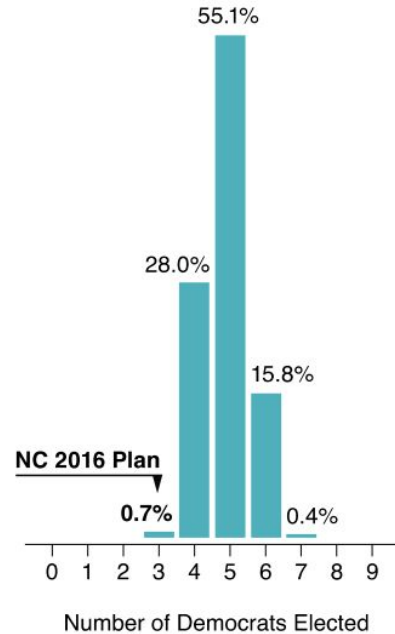
Markov chain Monte Carlo



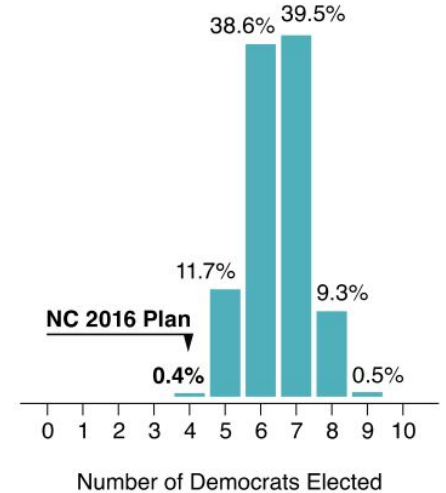
What is Markov chain Monte Carlo? (MCMC)



A. Election data from 2016



B. Election data from 2012





Rucho v. Common Cause (2019)

- ◉ Common Cause, NC Dem party + voters argued 2016 congressional map was gerrymandered
 - Mathematicians filed amicus brief: showed map was a far outlier
- ◉ **Ruling:** gerrymandering beyond reach of federal courts
 - responsibility of states and Congress

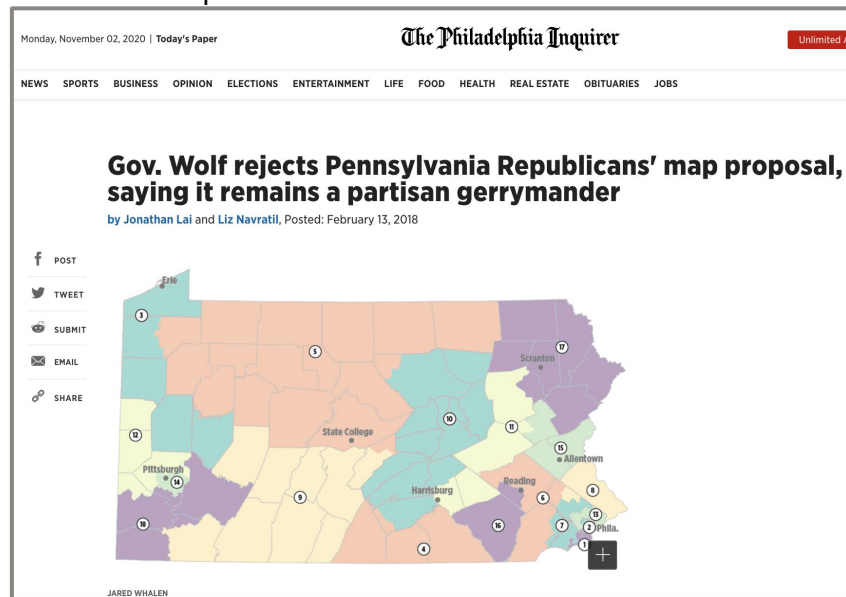


State Level Victories



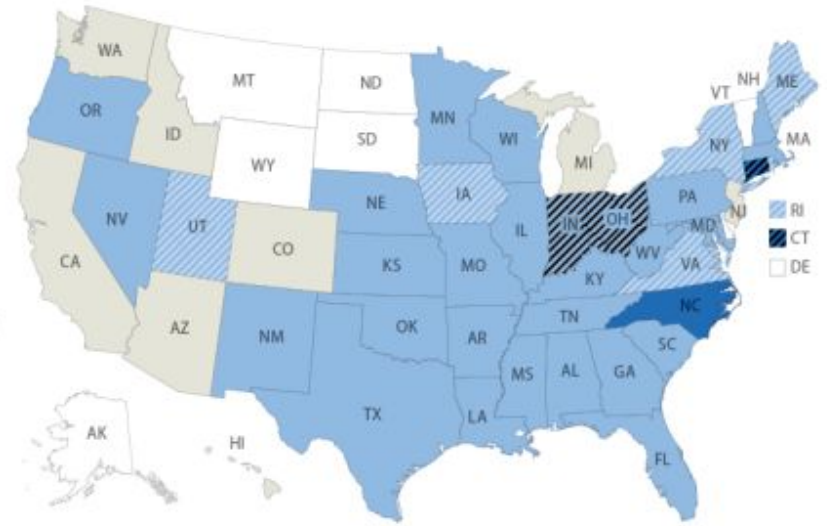
Amendment 1 + Efficiency Gap (MO, 2018)
Redistricting handled by non-partisan state demographers.

MCMC in PA Supreme Court (2018)
Rejected Republican gerrymandered district map.





Emerging Guidelines



Roles:

- indep. election commissions

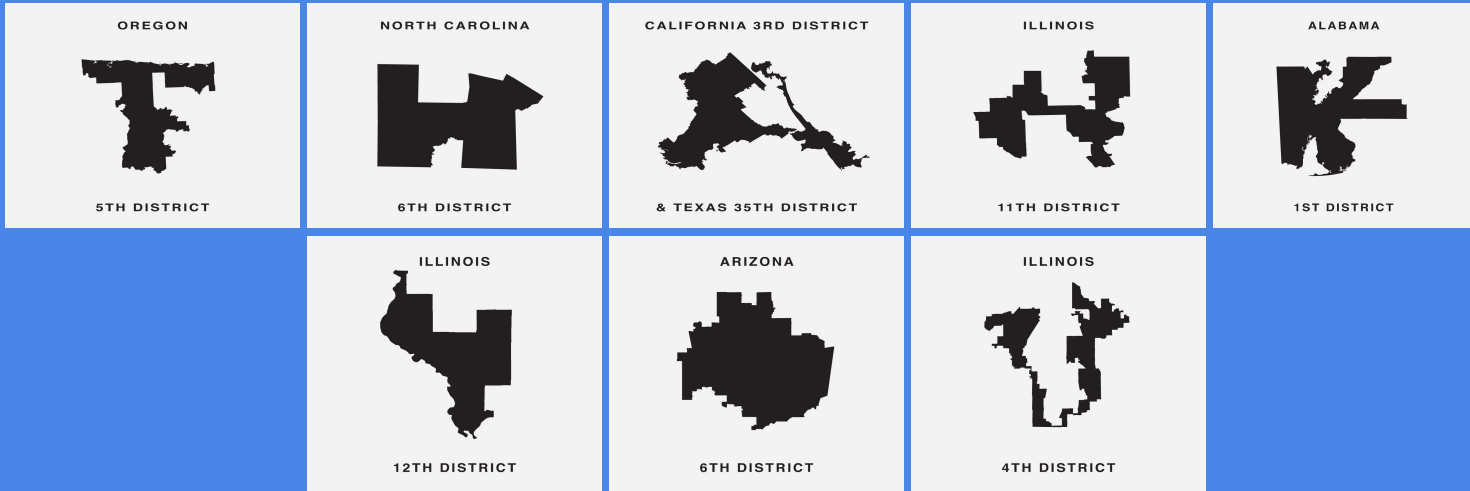
Requiring:

- competitiveness
- proportionality*

Prohibiting:

- favoring incumbents
- using partisan data

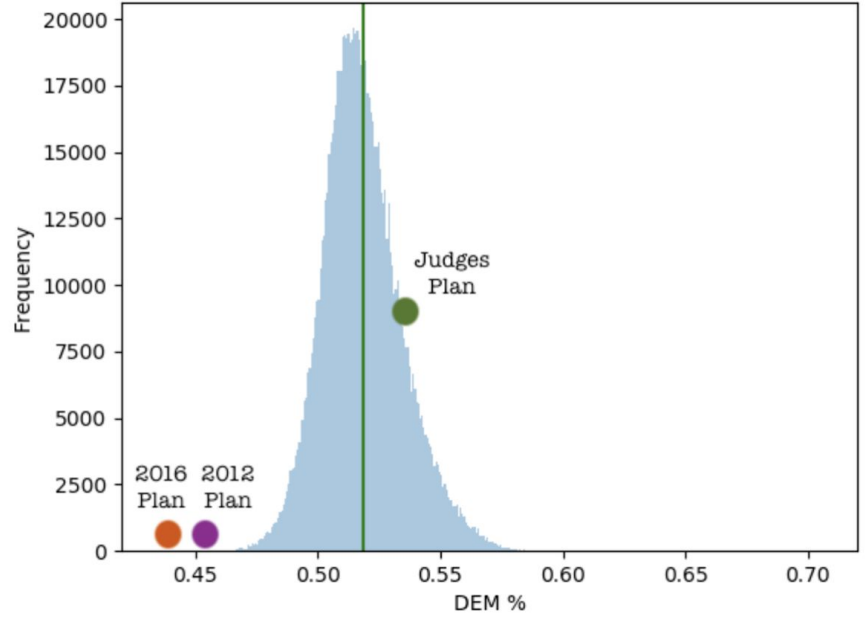
*starting 2021, Ohio



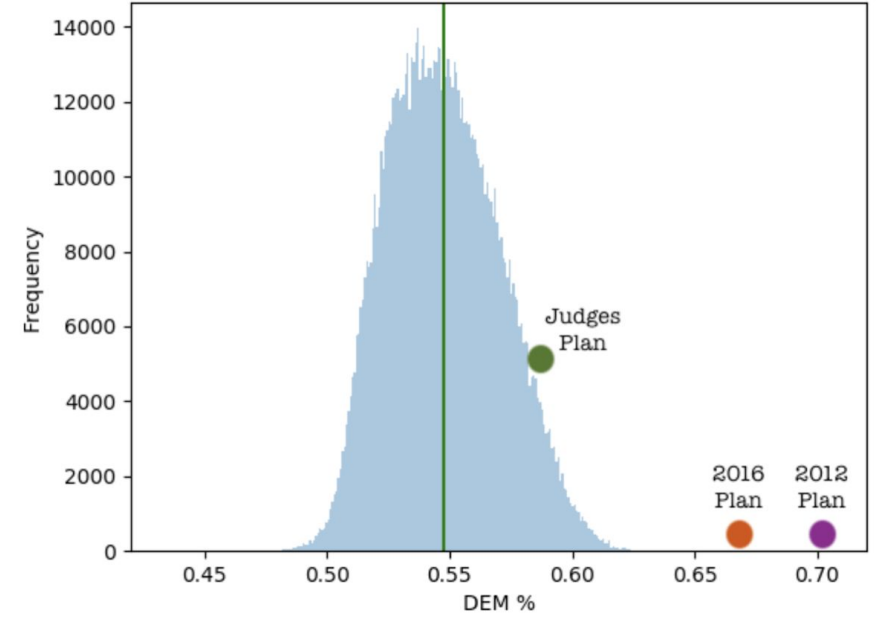
Special thanks:

- Professors Stanley Chang and Ismar Volić
- Minerva Johar, Rebecca Ye, & Eliza Zizka
- Cicely Henderson & Lisa Orii
- Robin McLafferty

District # 10



District # 11





Legality/Constitutionality

Equal Protection Clause of the 14th Amendment

- prohibits states from denying any person within its jurisdiction the equal protection of the law

First Amendment

- forbids state legislatures from discriminating against voters with disfavored views via the redistricting process

VRA addressed racial gerrymandering as one of many barriers to voting

- affirmed in *Miller v. Johnson* (1995)



Efficiency Gap

- intuitive and easy to calculate
- based on actual election results
 - can therefore provide evidence of real harm
- boils gerrymandering down to one number
- unintuitive conclusions
 - a state where one party wins 60 percent of the vote and 60 percent of the seats would get flagged for extreme partisan gerrymandering—in favor of the losing party
- overly simplistic
- doesn't consider political geography



Relevant Teams

- ◉ Metric Geometry & Gerrymandering Group
(Tufts)
- ◉ Princeton Gerrymandering Project
- ◉ Wesley Pegden, Alan Frieze, Maria Chikina
(Carnegie Mellon)

Others Resources: MIT Election Lab, Common Cause, FiveThirtyEight