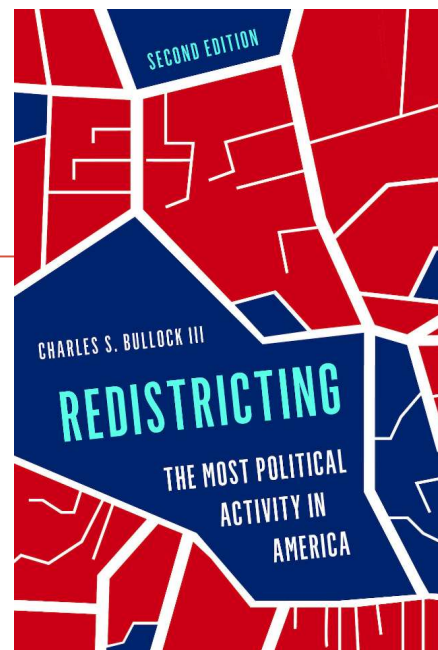


Redistricting



1

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Session Objectives

- Understand when and why states create new district plans
- Understand the historical and legal background to redistricting
- Understand typical constraints in redistricting

We primarily focus on Congressional district plans, but the same principles usually apply to state (senate and assembly) district plans

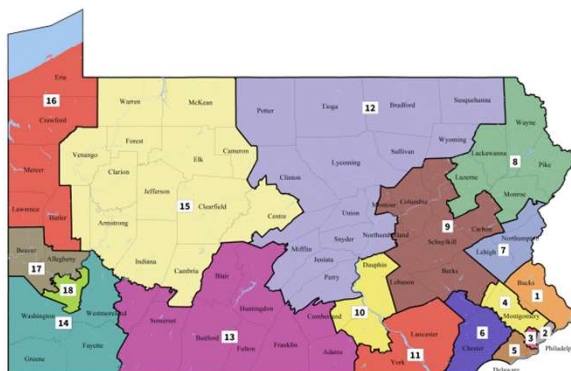
We deal with Gerrymandering in a subsequent session

2

Redistricting Summary

- Every state has a number of congressional districts, proportional to the state population
- The total US number of Congressional districts (435) are allocated to states based on population
- Population is recalculated after a US Census
- District boundaries must be recalculated if the number of representatives change or population shifts

Population in districts
must be almost equal

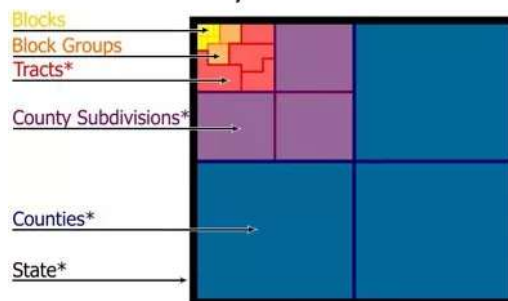


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Geographic Units

- Census blocks – smallest unit of redistricting geography (e.g., city block)
- Precincts – usually composed of multiple census blocks
- Voting districts
 - Congressional
 - State senate
 - State assembly

Census Summary Levels:



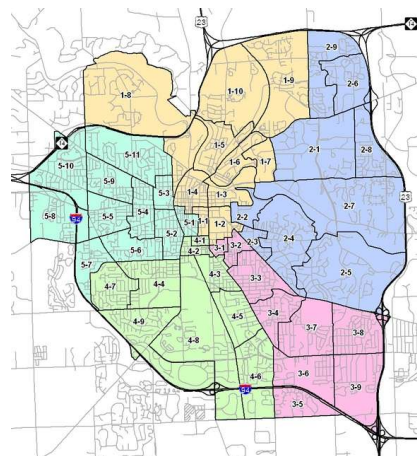
*Included with Maptitude. Blocks and block groups available separately.

Image: Caliper Corp.

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Precincts (sometimes known as Wards)

- Lowest level voting division
- Contained in one polling place
- Data usually available for voting totals
- Some data variation



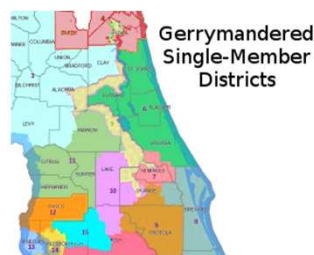
Sometimes multiple precincts share a polling place

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Districting Options

- The geography of the state is divided into geographical districts and
 - one representative is elected from each district (single-member)
 - Multiple representatives are elected from each district (multi-member)
- The entire state is used to elect at-large representatives

Multi-member districts are used in some state elections and in some foreign countries (e.g., Israel and the Netherlands)



Gerrymandered Single-Member Districts

VS.



Multi-Member Proportional Representative Districts

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Proportional Representation

- An intuitive notion that racial/ethnic groups and political parties should have a proportion of elected representatives similar to the percentage of the voters.
- Single member district systems typically reward the majority party with a greater proportion of the seats

Matthew Principal - "For whosoever hath, to him shall be given, and he shall have more abundance: but whosoever hath not, from him shall be taken away even that he hath."

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Who Does Redistricting?

- State legislature – used by most states (39)
 - Plan passes like regular legislation
 - Most subject to veto by the governor and subsequent override
 - Connecticut and Maine require supermajorities
- Political commissions
- Backup commissions
- Independent commissions – Arizona, Alaska, California, Colorado, Idaho, Michigan, Montana, New York, and Washington
- Advisory commissions (Iowa, Maine, Utah, and Vermont)

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State House Trifecta Map

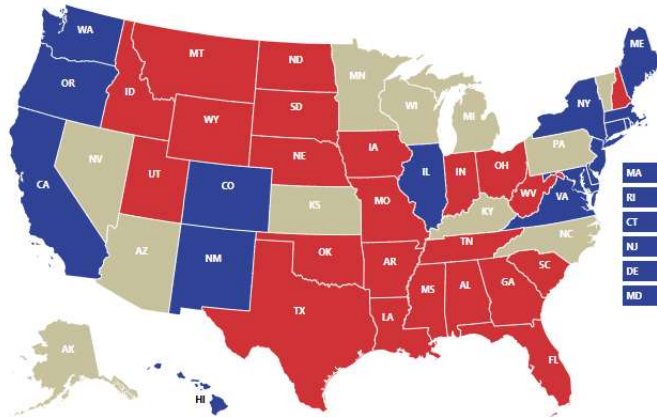


Image: 270towin.com

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Judicial Challenges

- State courts have primary responsibility
- US Supreme Court has heard some challenges (primarily associated with the Voting Rights Act)
- Challenges are usually associated with possible violations of legal requirements for redistricting

We discuss the VRA in a subsequent session

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When is Redistricting Done

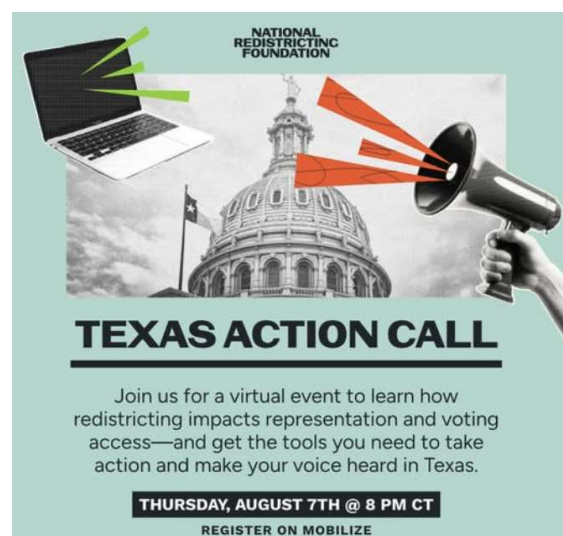
- Following the census (due to population shifts)
- Following court decisions
- To obtain partisan advantage

Before 1960, district lines remained unchanged for decades

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Political Focus on Redistricting

- Operation Redmap – 2010
- National Democratic Redistricting Committee – 2020
- Focus on state Supreme Court Justice contests
 - E.g., -Wisconsin



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Census Citizenship Issues

- Reduced census count in some states might change the number of congressional districts
- In 2020 President Trump ordered the exclusion of noncitizens from the Bureau's determination of how many House seats each state would receive.
- Overcounting can result from multiple homes and students

Thomas Hofeller - developed projections that asking about citizenship would reduce the count of minorities and in doing so advantage the GOP when it came to apportioning congressional seats among the states and distributing legislative seats in a jurisdiction

The Census Bureau estimates that the undercount in Georgia in 1990 amounted to 142,425 people,

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Redistricting Considerations

- Contiguity
- Split counties/Respect for political boundaries
- Competitive districts/protection of incumbents
- Equal population
- Communities of interest
- Compactness
- Others, depending on state legal requirements

It is virtually impossible to create districts that satisfy all these considerations

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Contiguity

- Notion that a person can go from one part of the district to another without leaving the district
- Exceptions when a state is segmented by large bodies of water (e.g., Michigan and Virginia)
- Examples of odd contiguity includes districts that connect population centers by corridors (e.g., rivers) that have zero population (aka duck contiguity)

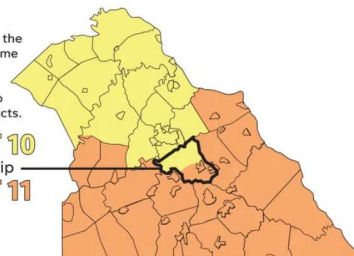
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Split Counties

- Originally a preference in rural areas
- Difficult to maintain with increasingly stringent population equality goals
- Split counties are often used to crack voters of the opposing party
- Examples: Nashville, TN, Austin, TX (and other parts of Texas)
- Split counties that are politically homogeneous indicate possible Gerrymandering

A plan approved by the Pennsylvania Supreme Court splits York County – and York Township – into two congressional districts.

DISTRICT 10
York Township
DISTRICT 11



Split counties are counties that contain two or more voting districts

Image: York Daily Record

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Example – Split Counties

- For 2022, Nashville, TN was split into 3 congressional districts
- Previously, Nashville was represented as the 5th Tennessee Congressional district and represented by Jim Cooper (D)



Image: Nashville Hustler

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Competitive Districts

- The greater the number of marginal districts, the greater the potential for achieving policy change
- The smaller the shift in the electorate needed to replace one party with another, the more responsive the system
- Incumbents, not surprisingly, prefer electoral systems that returned them to office with comfortable margins.

the Brennan Center for Justice,
suggest that only about 30–40 are
truly competitive in many scenarios

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Protecting Incumbents

- 8 states have guidelines for not pairing incumbents
- Trifecta states tend to protect incumbents of the party in power
- Split states tend to protect incumbents of both parties
- 14 states prohibit consideration of where an incumbent lives
- 8 states have guidelines to maintain congressional district cores
- 8 states ban incumbent pairing

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Equal Population

- Mandated by the Supreme Court
- Congressional districts should contain approximately equal populations
- No uniform definition of equal population
- Questions about meaning of population (e.g., total, VAP, CVAP)
- Measures
 - absolute value percentage variation between most populated district and least populated district relative to the total population
 - Percent variation from ideal population

The ideal district population is the total population divided by the number of districts

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Census Sampling

- Census Bureau calculates estimates, referred to as the American Community Survey (ACS)
- Statisticians content that sampling is more accurate
- Supreme Court considered whether to use the ACS estimates instead of a census population count and resulted in the requirement for census counts
- SC did allow sample to be used for allocation of funds and drawing of districts

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Population Equality

- Not using population equality led to more power for rural districts
- Wesberry v. Sanders (1964) – SC ruled that congressional districts must have equal population – ruling based on “one person, one vote” Prior to the 1960, state allocation was based on population, but district sizes were not equal. There were also a number of at large delegates
- How equal is equal?
- Even after Wesberry, districts were not very equal (but better than before) Georgia went from 69-209 to 84-116 (percent of ideal)
- Wesberry was intentionally fuzzy
- Subsequent decisions were more precise
- Ruling caused states to split counties
- After the 1980 census court seemed to accept a .7% difference, but challenges with smaller numbers usually win

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How to Reach Equal Population

- Move precincts – 1,000-2,000 voters
- Move census blocks and redefine precincts
- Other plans (e.g., state) can have larger deviations

Census blocks must have visible boundaries
(e.g., streets, rivers, streams, etc.)

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Communities of Interest

- 21 states require maintenance of communities of interest for Congressional elections
- “Earmuff” District is predominantly Hispanic (encircles a 55% African American district)

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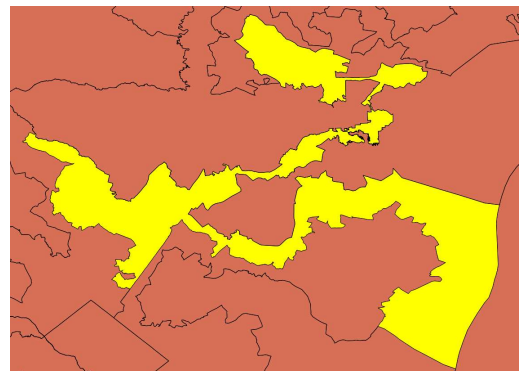
Other Population Issues

- Courts might allow a larger population deviation if done for other reasons
 - Avoid splitting racial groups
 - Avoid splitting counties
 - Precincts
 - Keep communities of interest together
 - Avoid pairing incumbents
 - Following natural boundaries
- To adhere to one person one vote, maybe registered voters or VAP should be measured, but courts focused on total population

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Compactness

- Required by approximately 40 states
- Best understood by people engaged in redistricting
- Courts tend to comment that oddly shaped districts indicate Gerrymandering
- Not a single best measure
- Measures usually a ratio of two measures (e.g., area vs bounding area)
- Most intuitive is the Polsby Popper measure (measure of perimeter vs. area)



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Geometric Compactness

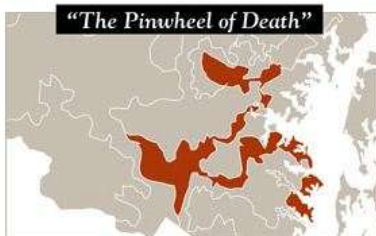
- How can we measure compactness (e.g., circle, square, or rectangle)
- Measures (Reock, Polsby-Popper, Convex Hull)
- Best understood by people engaged in redistricting
- Polsby-Popper
 - Most used/referenced
 - $= 4 * \pi * D_A / (D_P)^2$, where D_A is the area of district D and D_P is the perimeter of district D
 - Can be a computationally expensive calculation for congressional districts because the perimeter has many edges
 - Penalizes districts that feature a natural jagged boundary

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Examples

- National Gallery of Redistricting Art contains many examples of unusually shaped districts

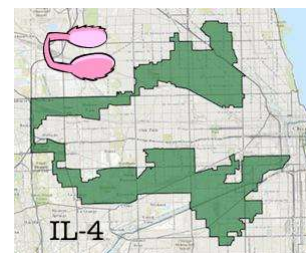
Maryland's 3rd district



Michigan 14



Latin Earmuffs



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Example – Compactness in NY

- We define a Python function to calculate the Polsby Popper score

```
ny_cd = gpd.read_file('con24.shp')
ny_cd1=ny_cd.iat[0,2]
import math
from shapely.geometry import Polygon
def calculate_compactness(poly):
    area = poly.area
    perimeter = poly.length # length of the exterior ring
    polsby_popper = (4 * math.pi * area) / (perimeter ** 2)
    return polsby_popper
pp = calculate_compactness(ny_cd1)
print('Polsby-Popper: ', pp)
```

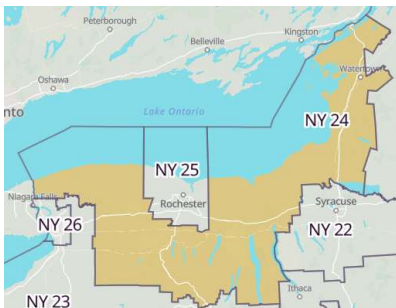
Polsby-Popper: 0.43132144914608483

A Polsby-Popper score below .3 is considered non-compact and a score below .05 extremely non-compact

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Example – Compactness in NY

- Does this NY (CD24) district look non-compact to you?
- CD24 voter for Trump (61/38) in 2024
- Is there a legitimate reason to carve out Rochester?



```
ny_least_compact=ny_cd.loc[min:min,: ]
ny_least_compact.plot()
plt.show()
```

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