


trade-offs in fair redistricting

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periodically, we need to redraw

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voting precincts

emergency services districts

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- state legislators draw their own districts
- draw a school zone so my kid and their friends go to the same school

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history of abuse, but unfairness is judged
ad hoc and is often hard to articulate

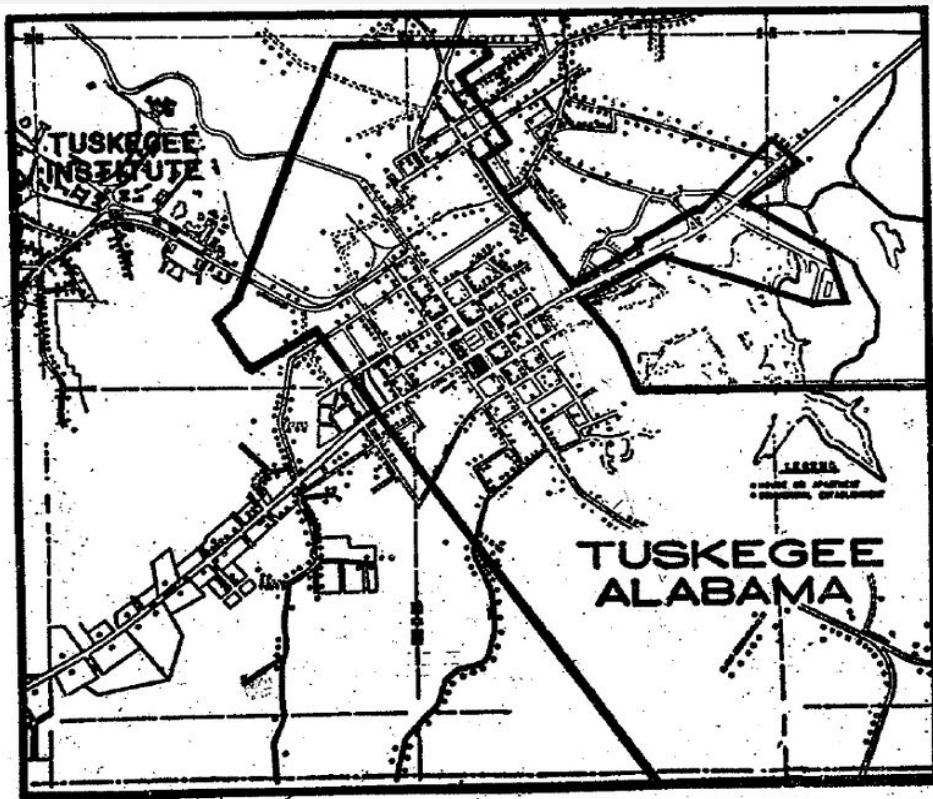
essex county, ma: 1812 state
senate districting plan designed
to help elbridge gerry's political
party



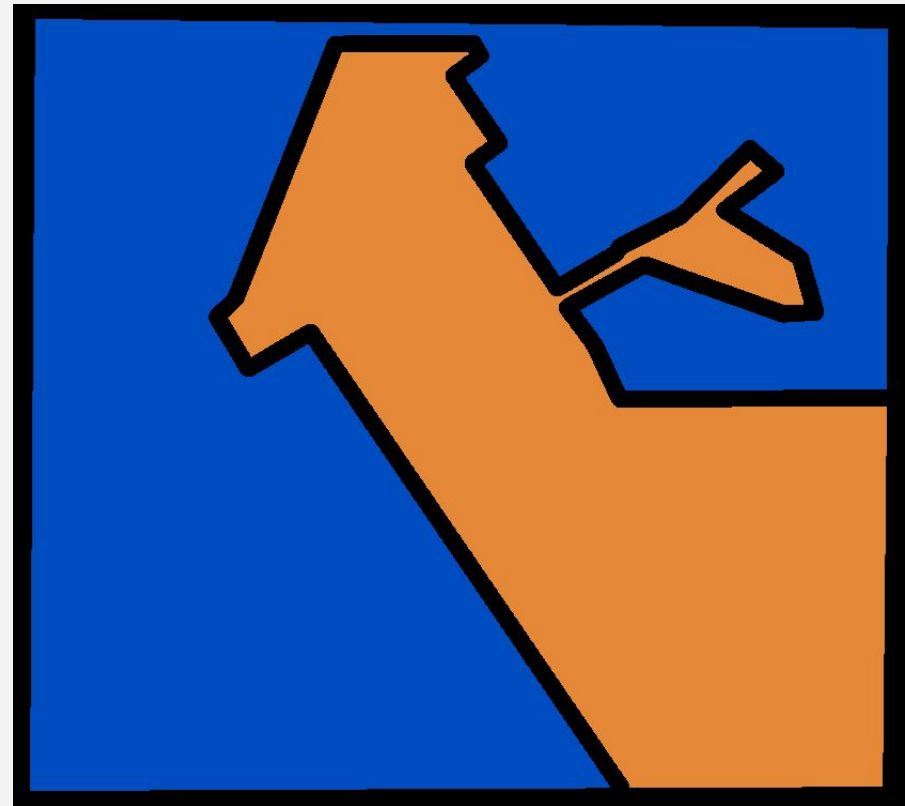
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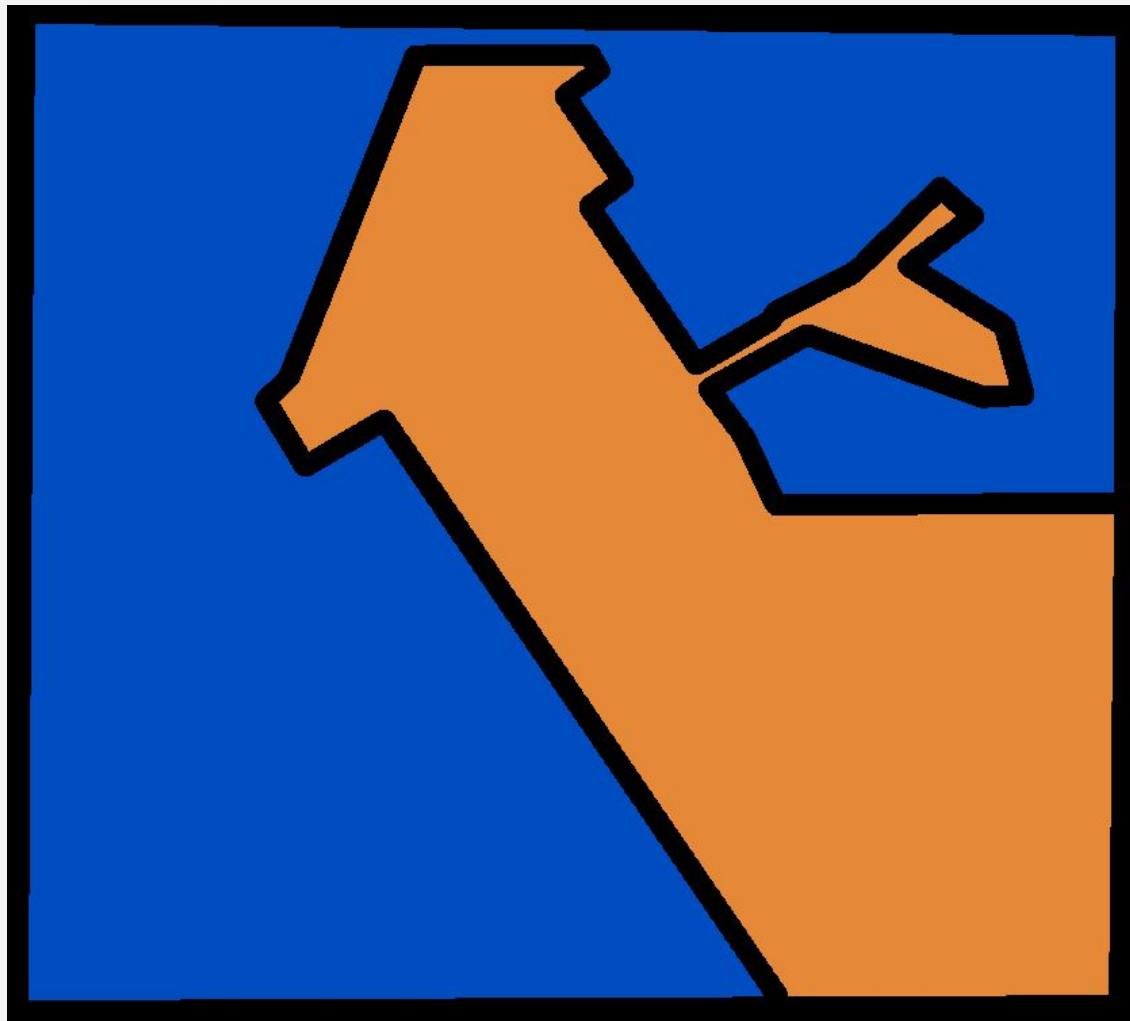
this district is oddly-shaped,
advantages one party in particular



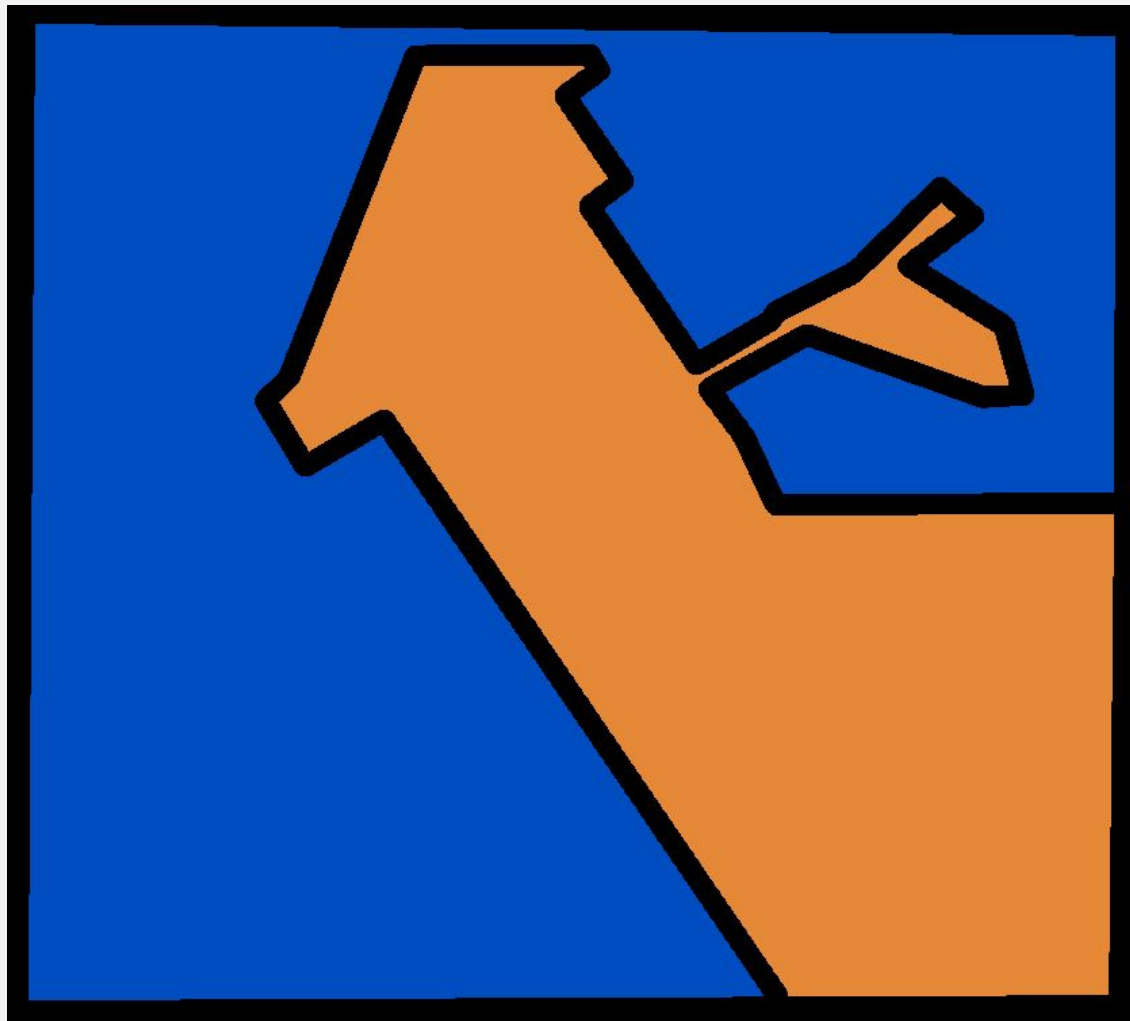


(The entire area of the square comprised the City prior to Act 140. The irregular black-bordered figure within the square represents the post-enactment city.)

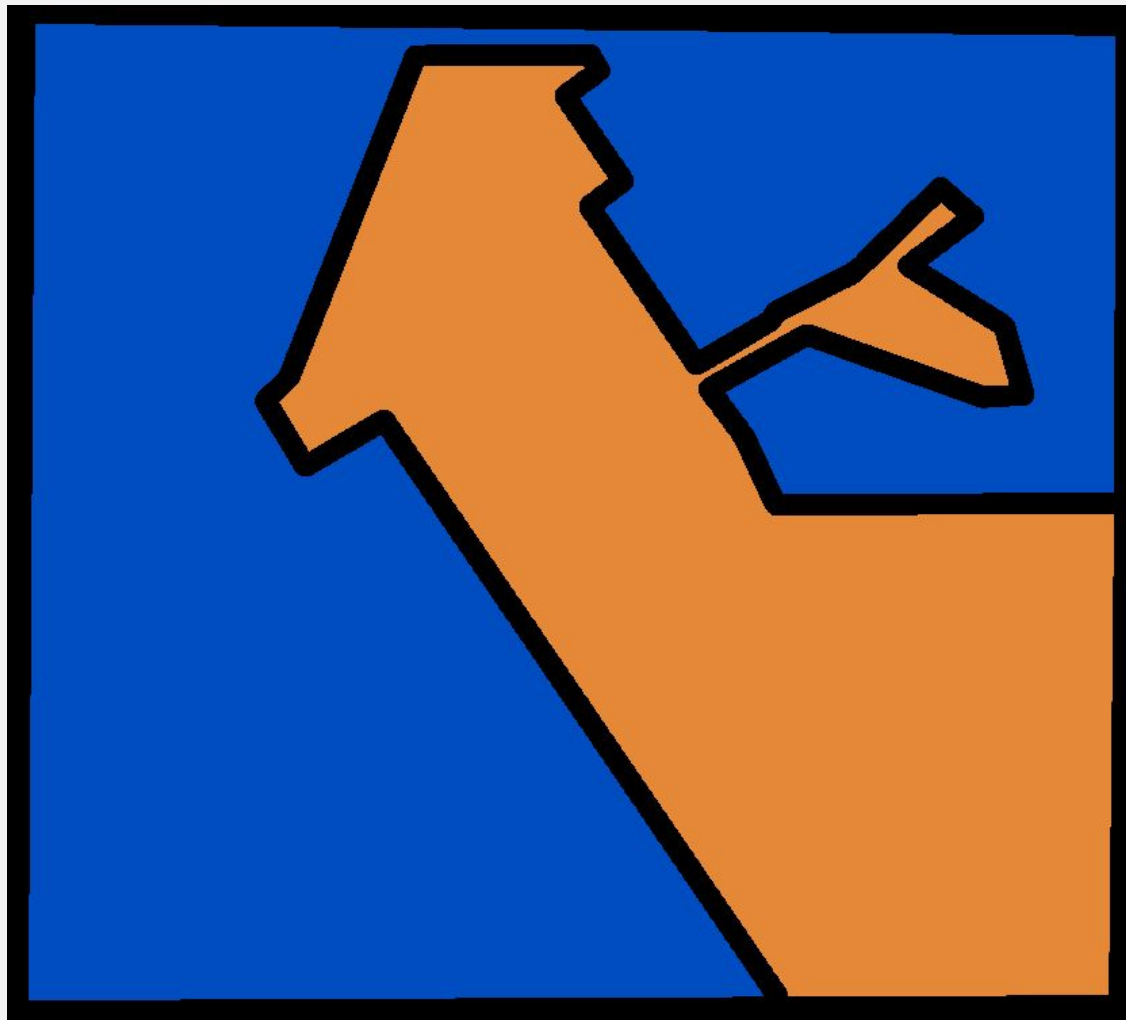




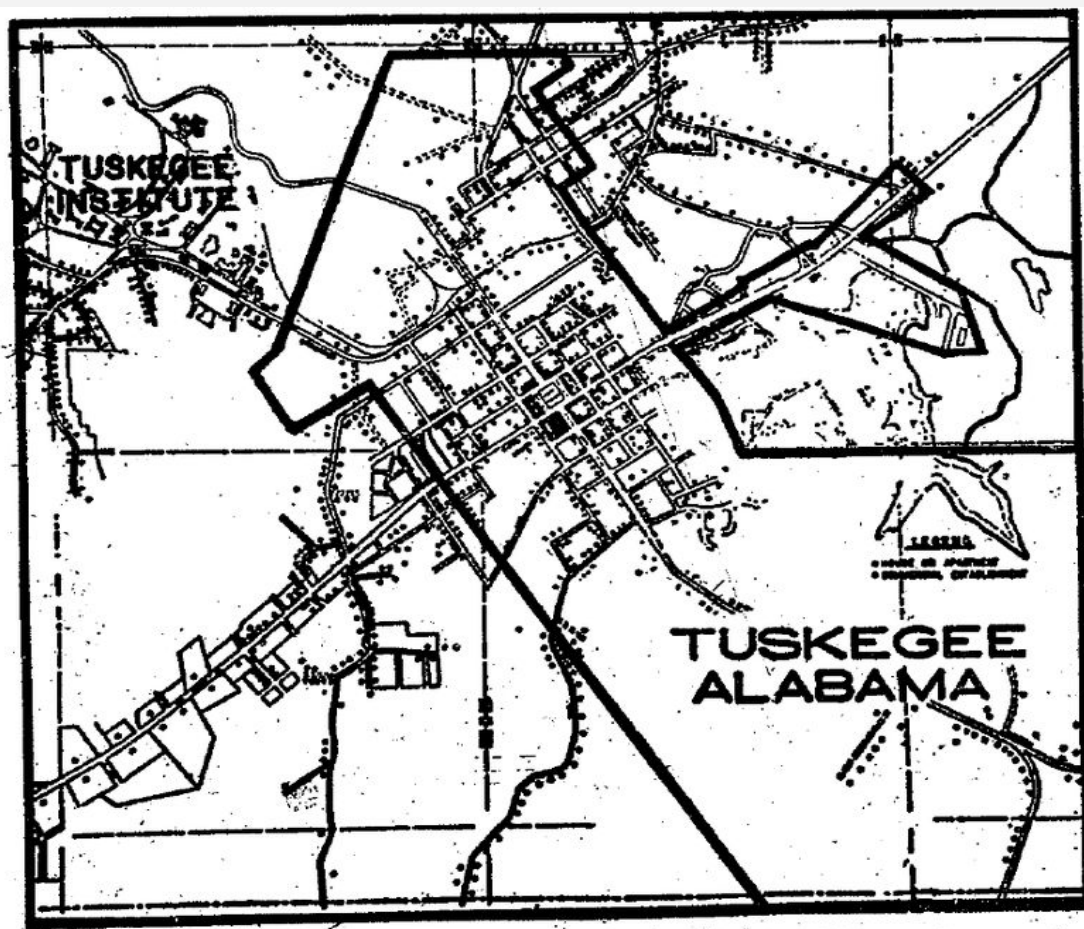
tuskegee, al, 1957: state
disincorporated black
areas of the city



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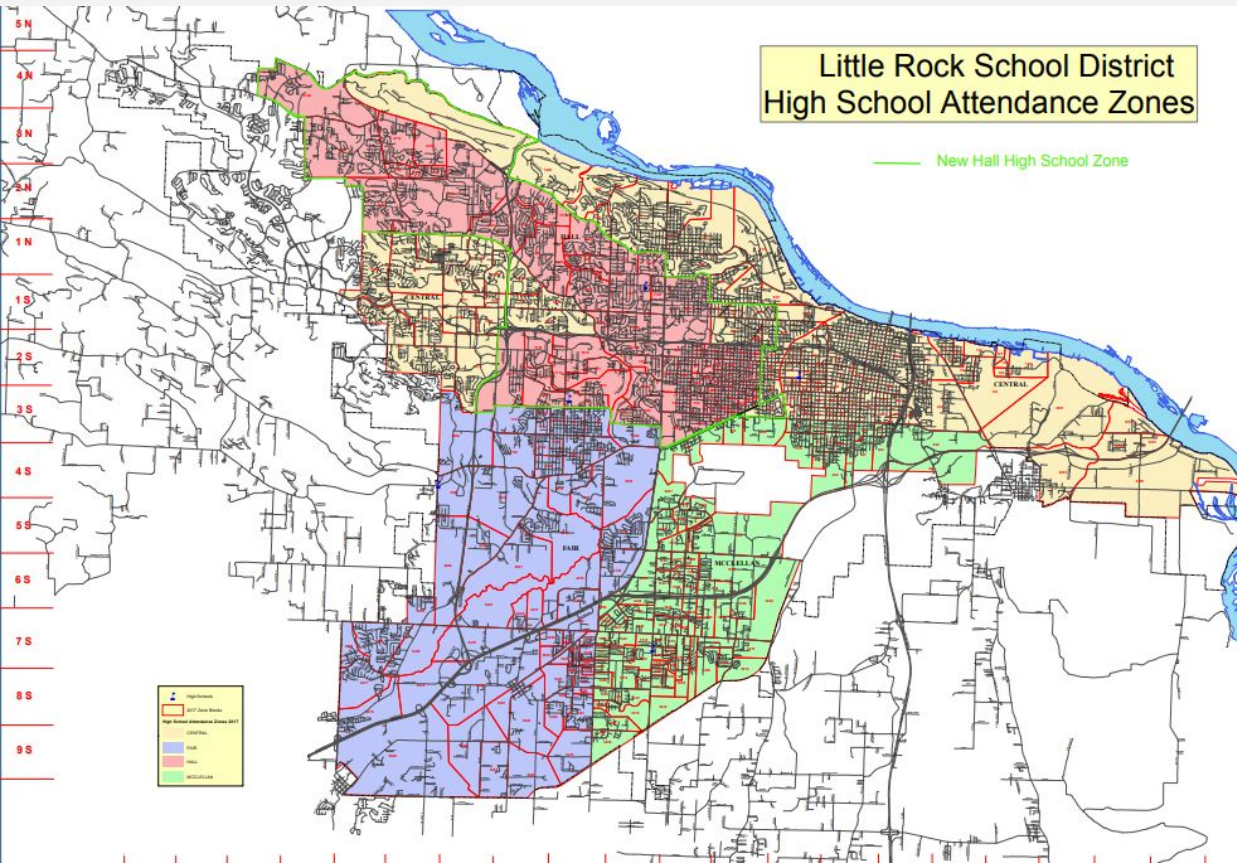


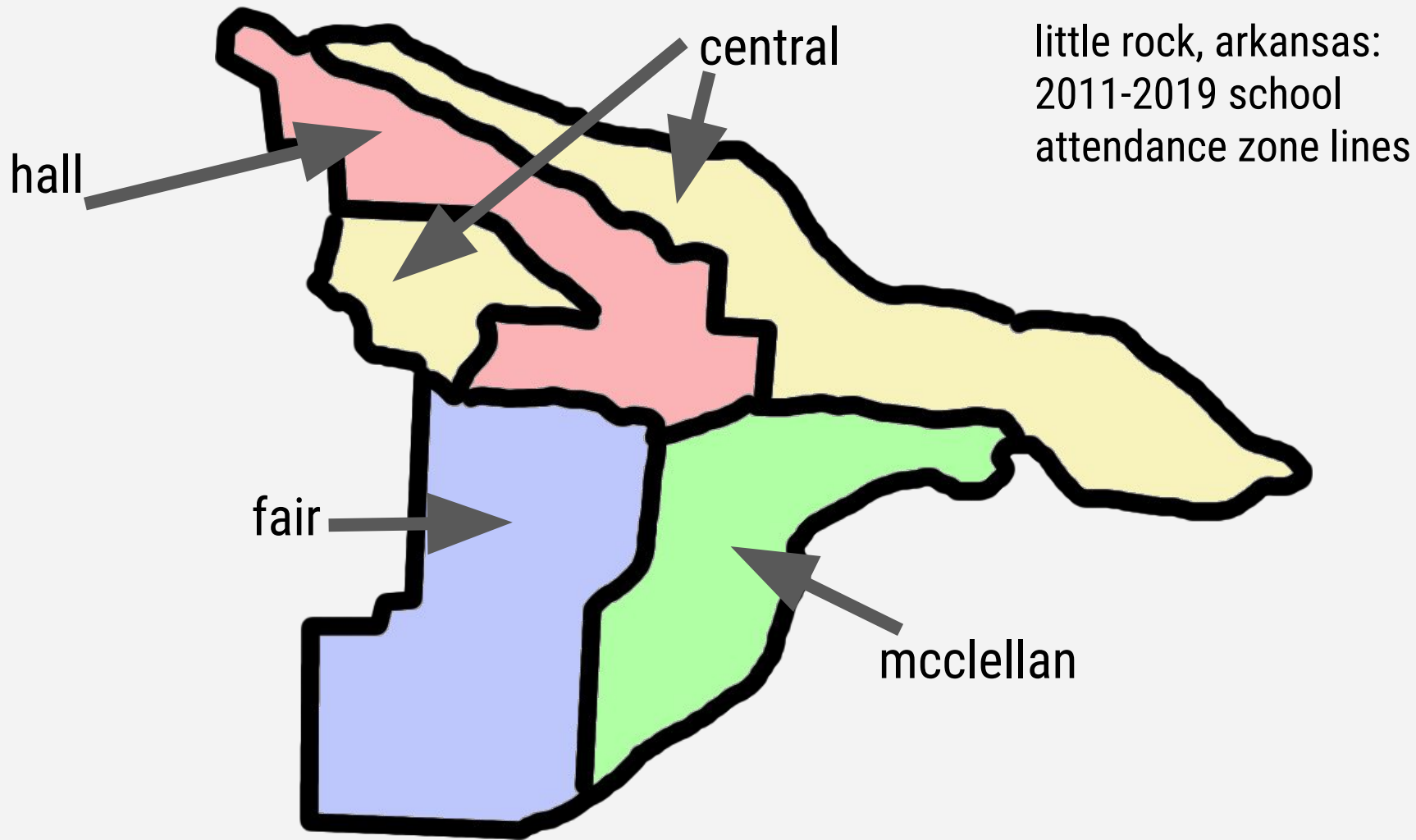
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tuskegee, al, 1957: state disincorporated black areas of the city (~80% of the population!) to prevent participation in municipal government

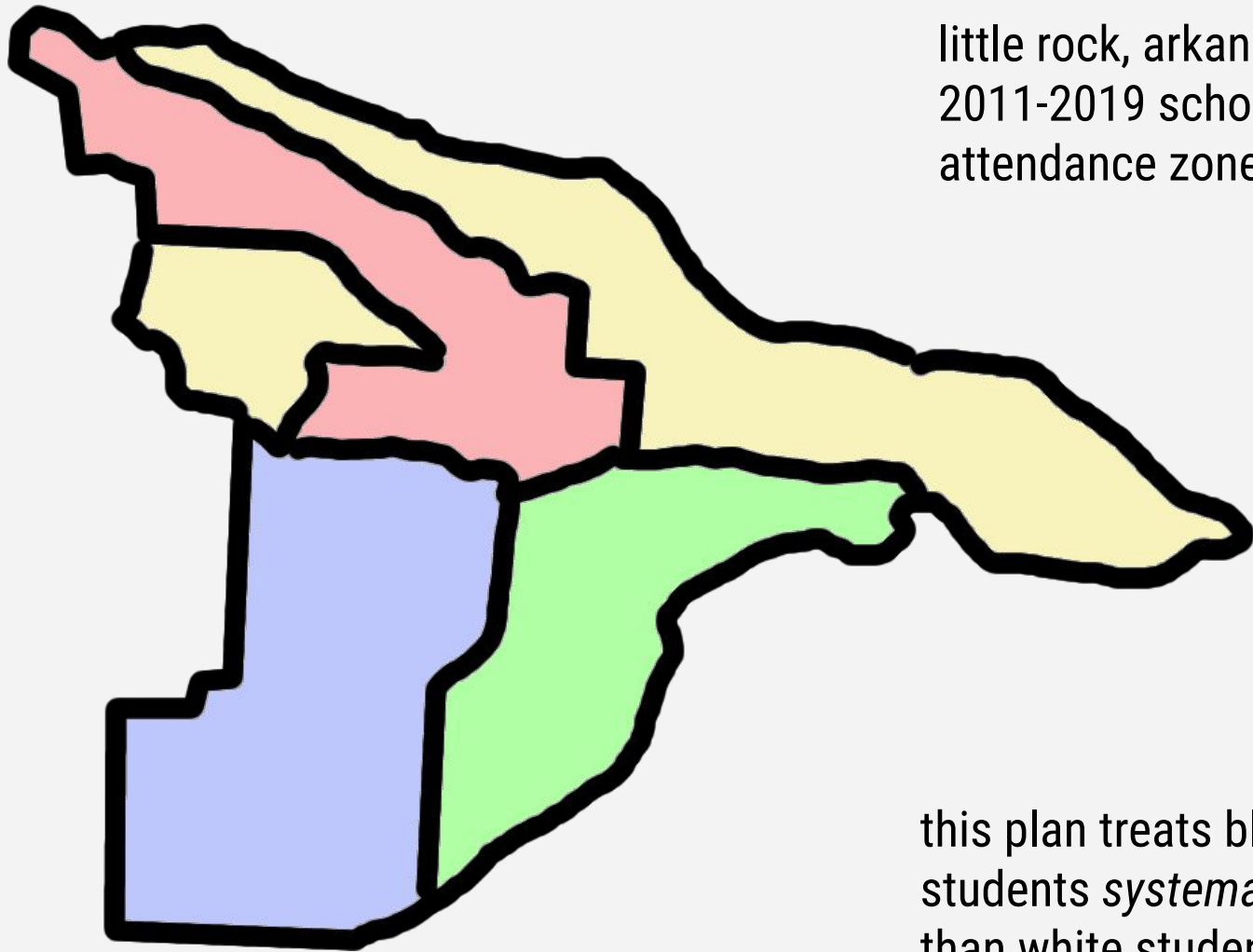
scotus: redrawing city boundaries serves "no countervailing municipal function"

little rock, arkansas:
2011-2019 school
attendance zone lines





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this plan treats black
students *systematically worse*
than white students

“This means, in view of the subtle possibilities for favoritism, that the human element must be removed as completely as possible from the redistricting process. In part, this means that the process should be completely mechanical, so that once set up, there is no room at all for human choice. More than this, [...] it should not be possible to predict in any detail the outcome of the process.”

On the Prevention of Gerrymandering, William Vickrey, 1961

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proposed algorithms since the '60s

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data and computers caught up in ~2010

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since *vieth* (2004), a search for a way to quantify partisan unfairness

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neutral process:

draw districts in a way that's
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no (dis)favoritism to parties,
groups, communities, or
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almost always formalized as
"draw pretty shapes"

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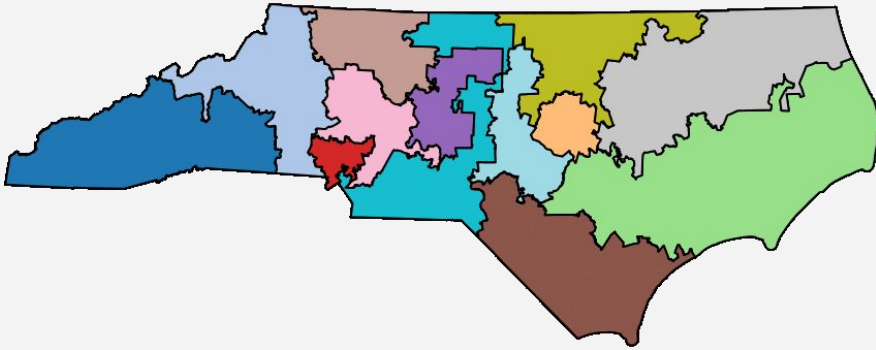
equitable outcome:

draw districts which give us a "fair" outcome

districts shouldn't systematically (dis)advantage any group, community, or individual

very hard to formalize and even harder to remedy, lots of attention currently to partisan (un)fairness

**what are the trade-offs between these
two frameworks?**



neutrality: compactness

draw districts to be as nicely-shaped as possible

equitable outcome: partisan symmetry

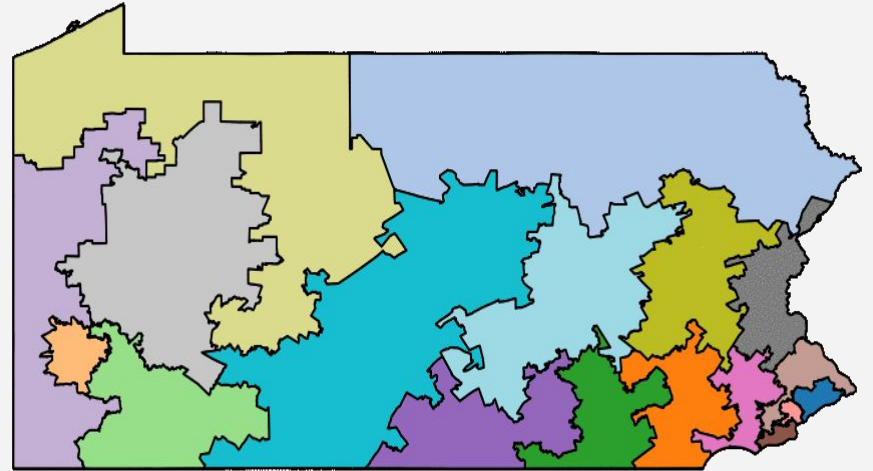
answer questions like “how different is the seats outcome when republicans get 55% of the vote from when democrats do?”

**data: pennsylvania and north
carolina**

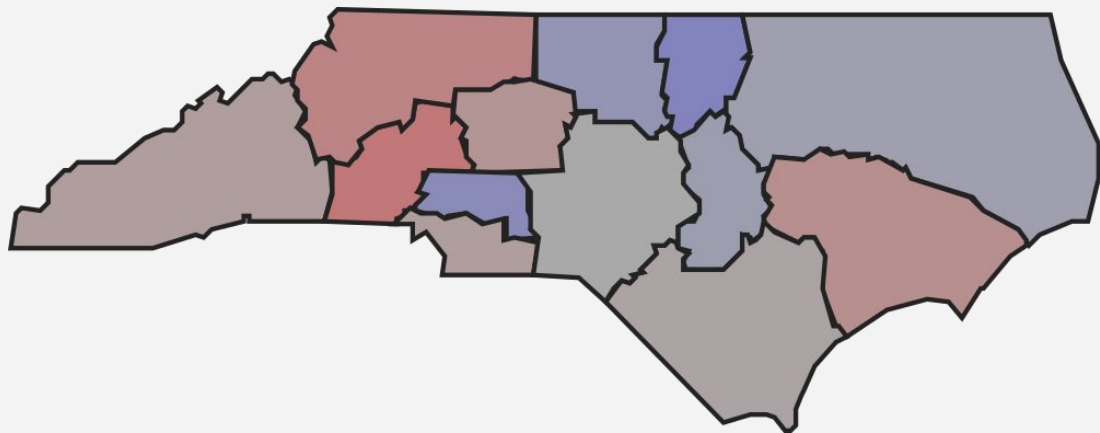
drawing districts at the *precinct* level

use an mcmc package to draw
hundreds of thousands of plans

evaluate compactness and partisan
symmetry



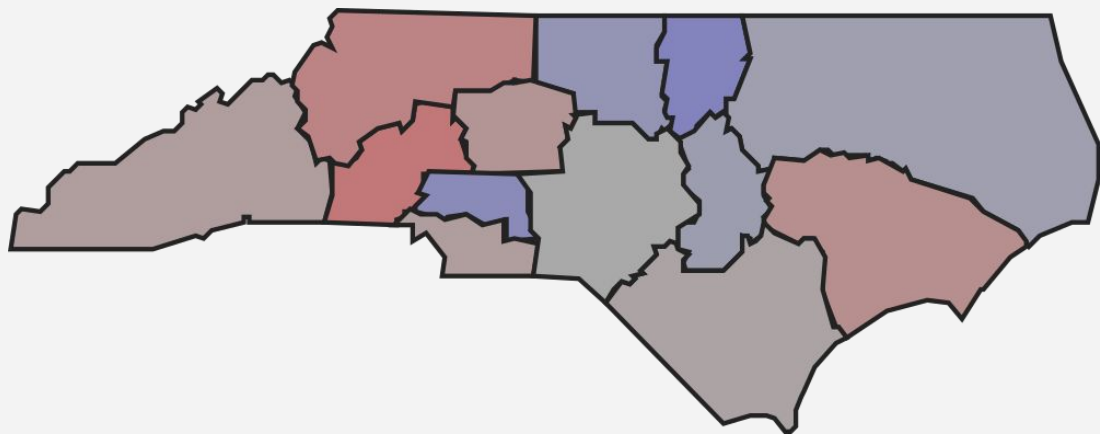
Compactness: 0.457



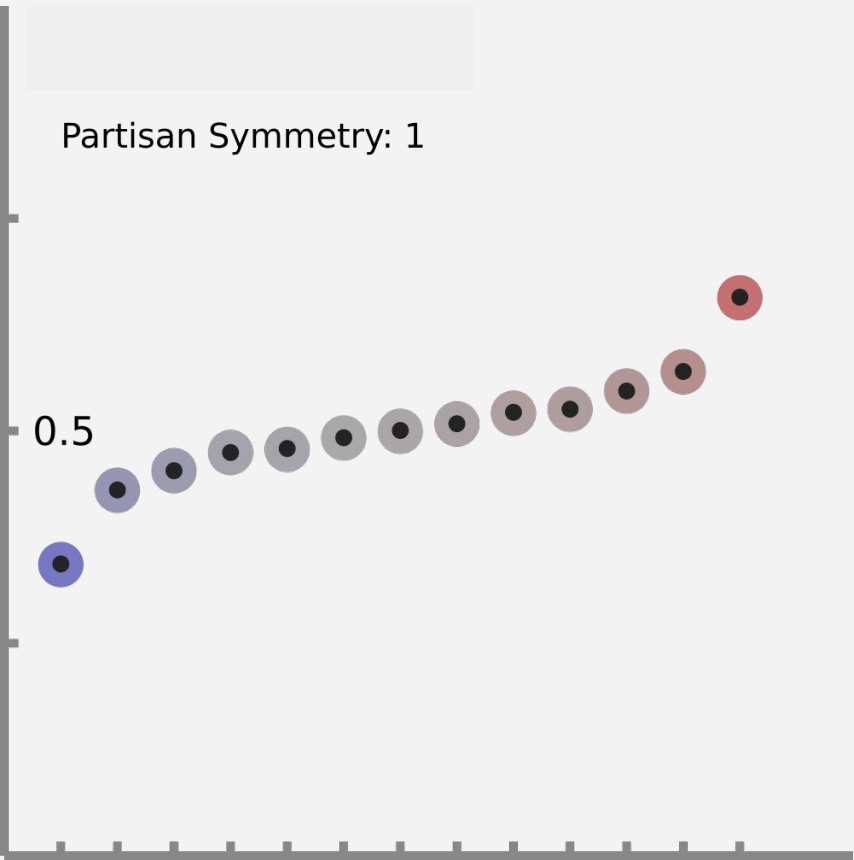
Compactness: 0.457

Partisan Symmetry: 0.989

0.5

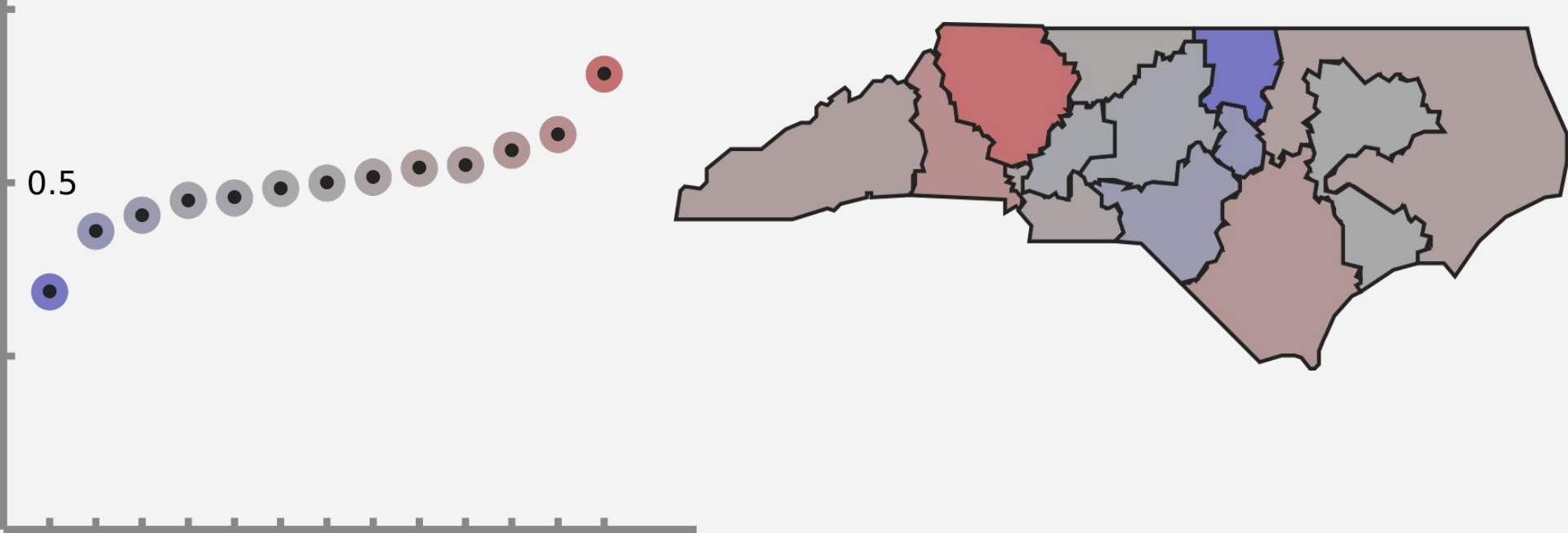


Partisan Symmetry: 1

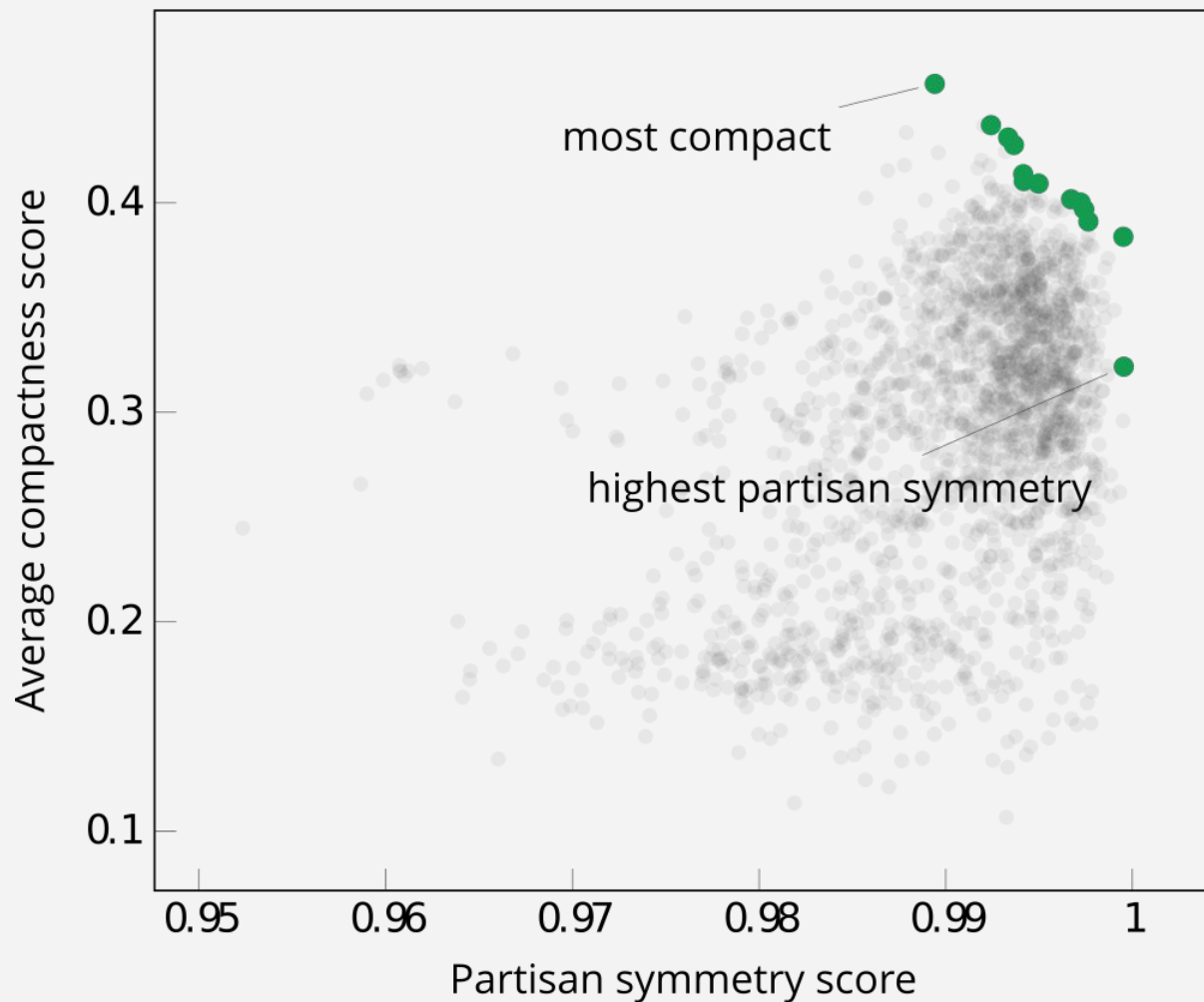


Compactness: 0.322

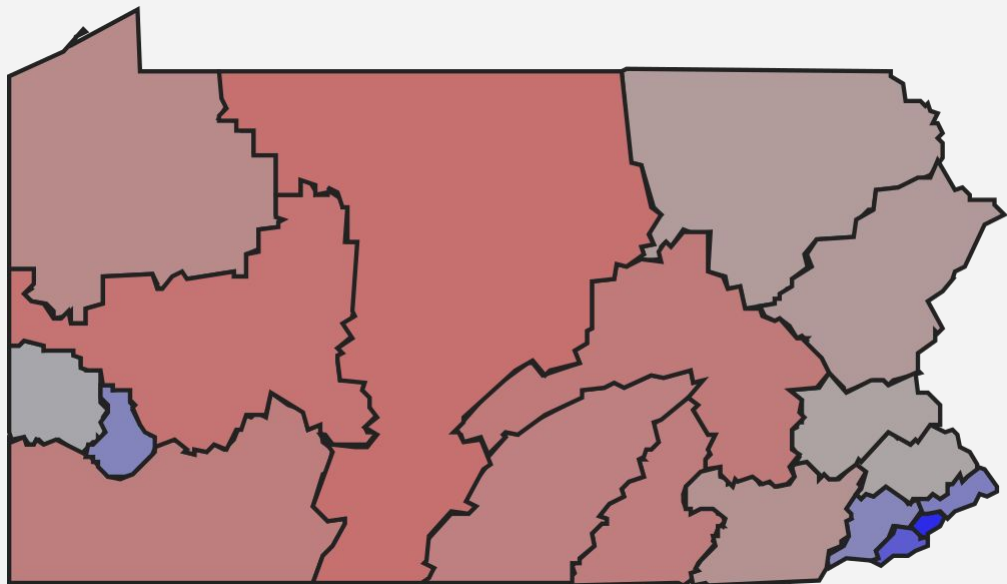
Partisan Symmetry: 1



NC Partisan Symmetry vs. Compactness



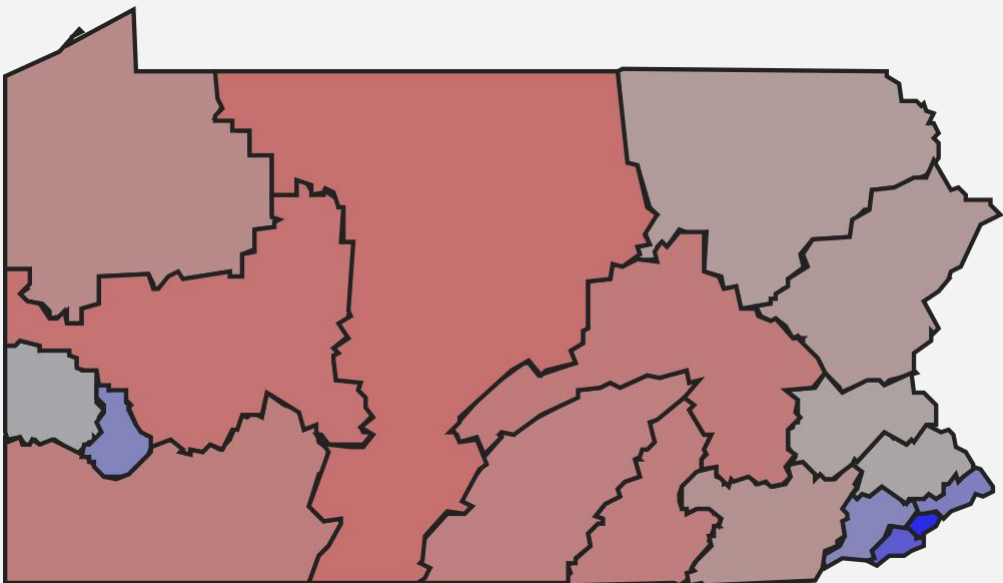
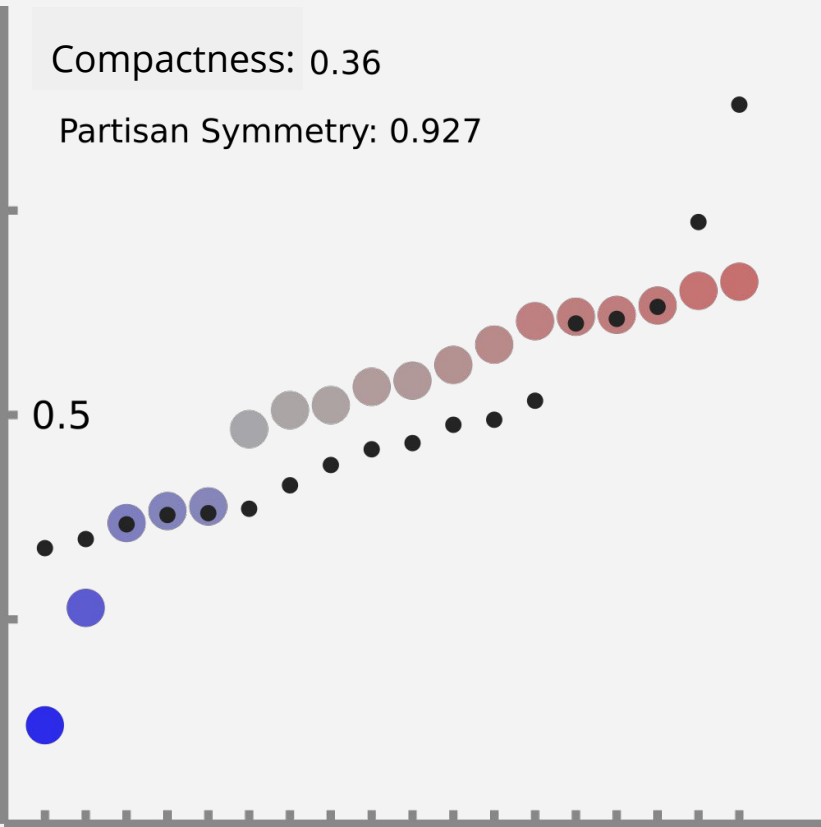
Compactness: 0.36



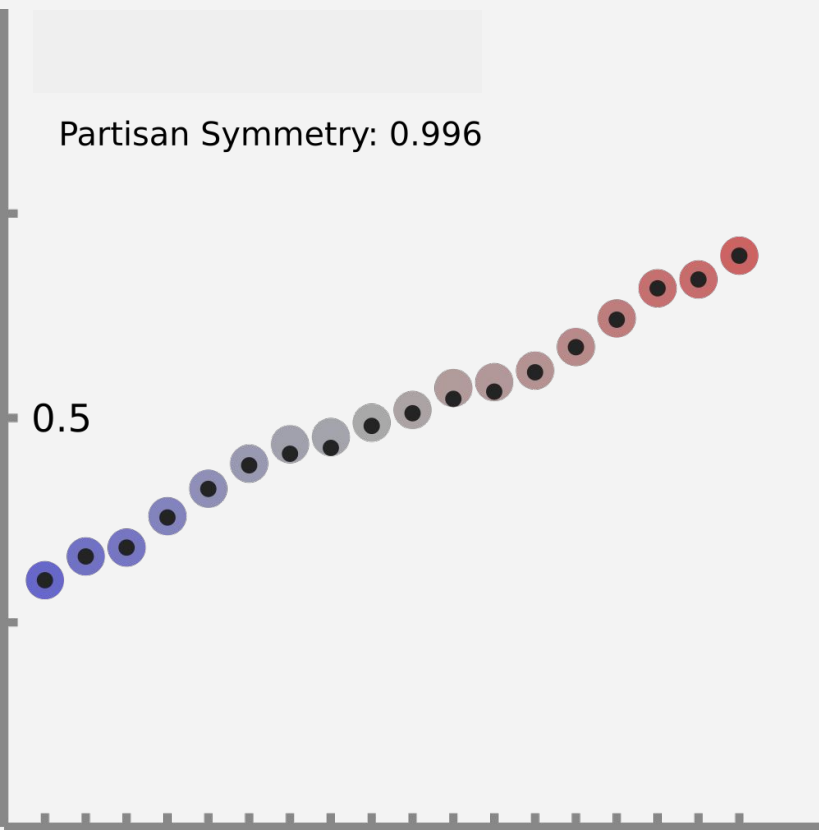
Compactness: 0.36

Partisan Symmetry: 0.927

0.5

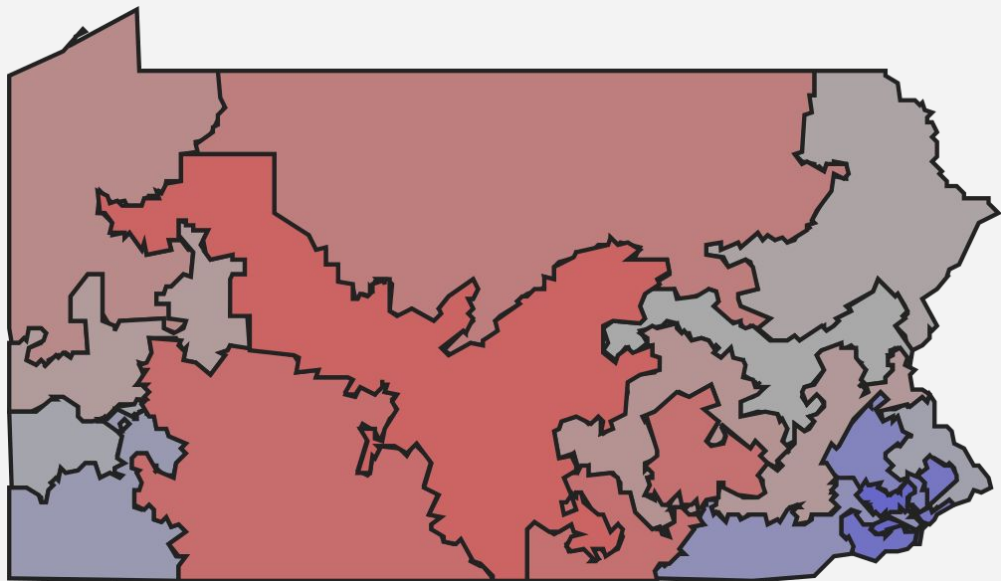
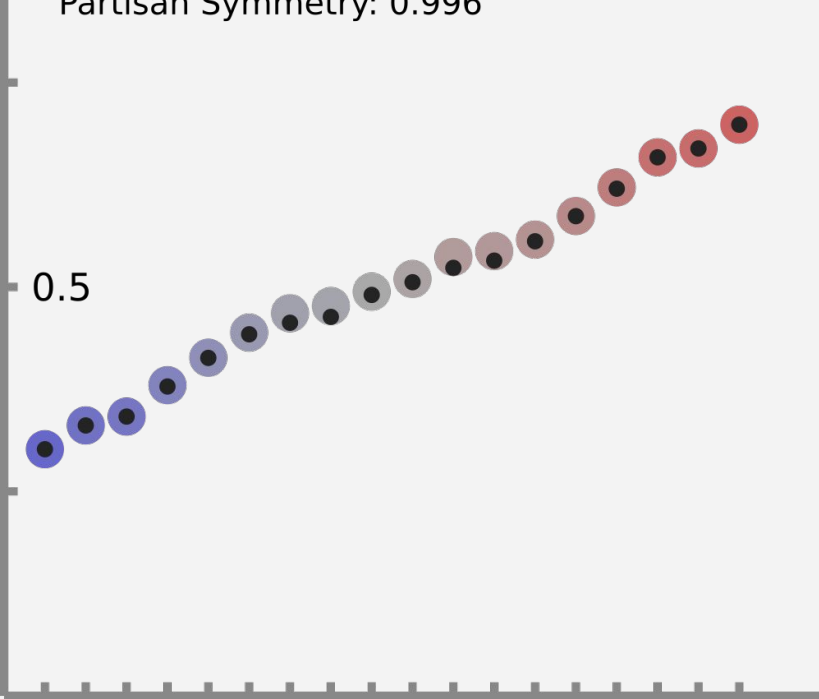


Partisan Symmetry: 0.996

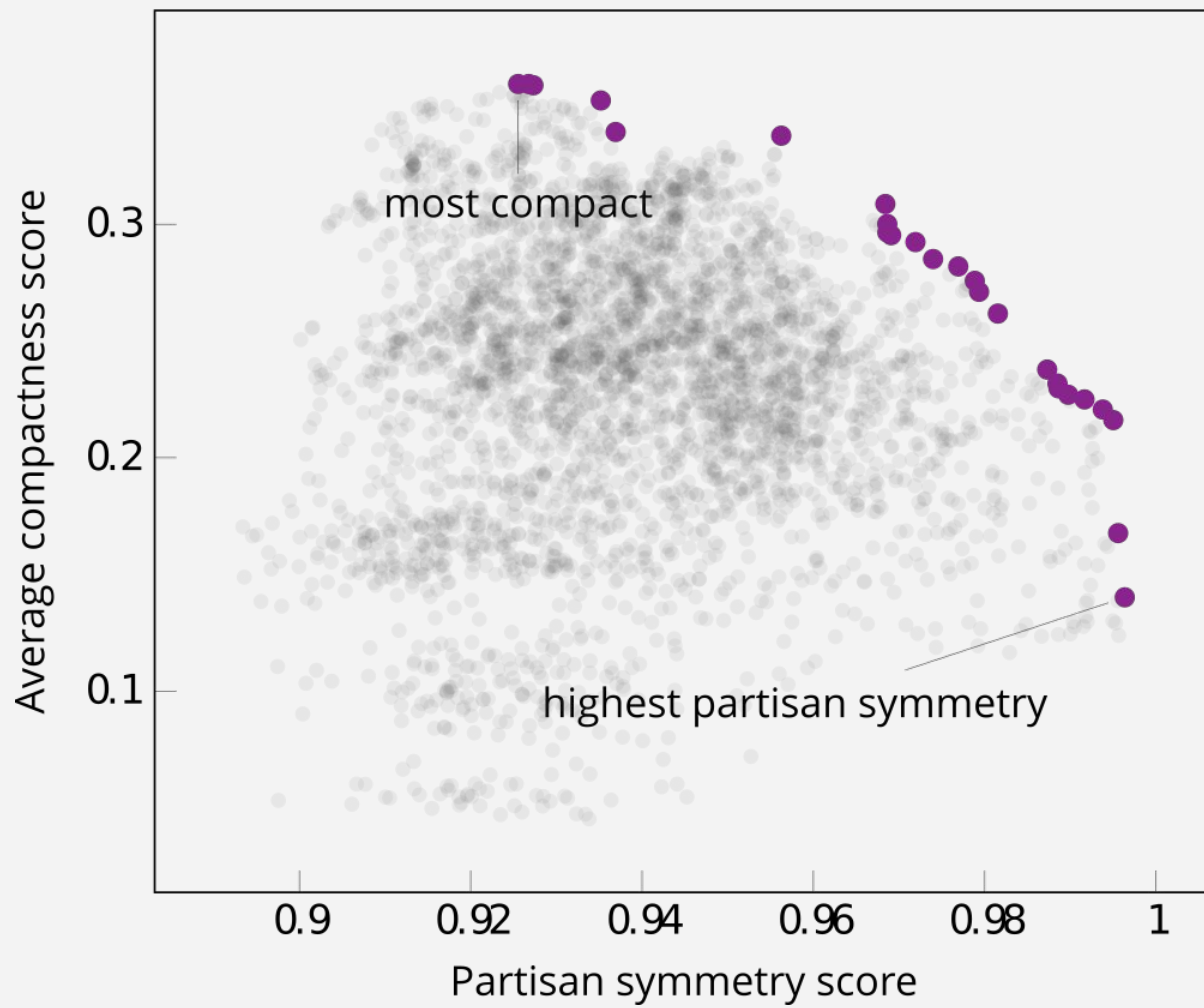


Compactness: 0.14

Partisan Symmetry: 0.996



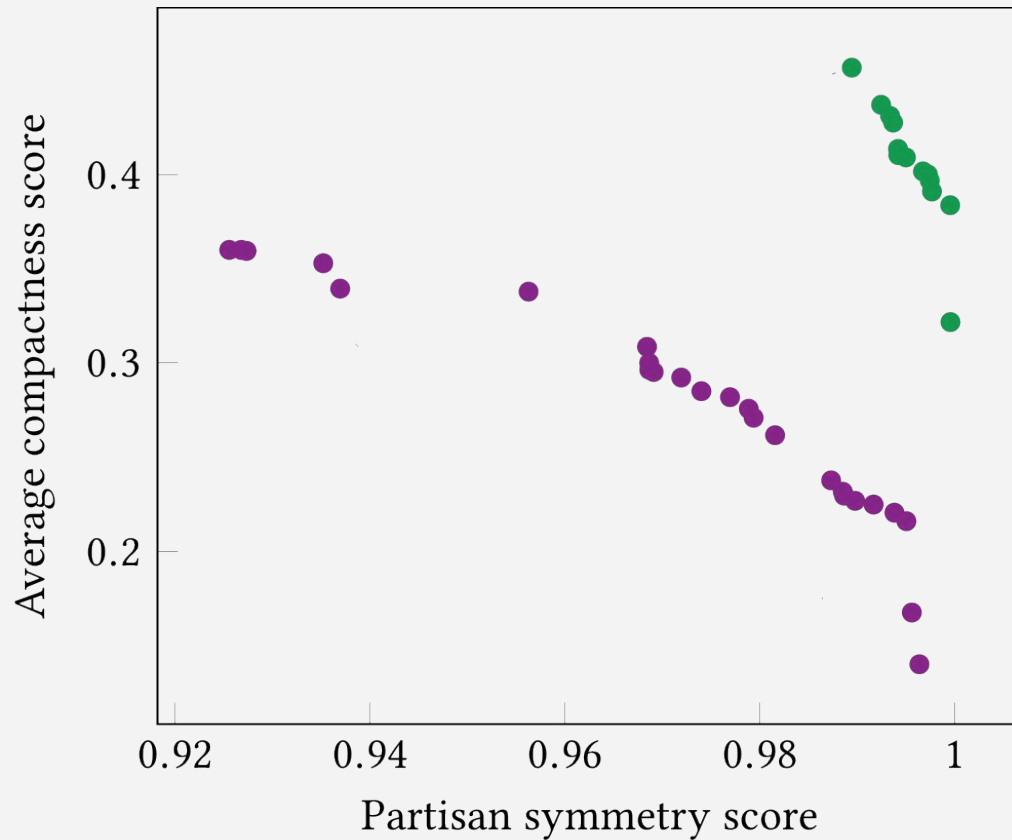
PA Partisan Symmetry vs. Compactness



algorithmic redistricting is possible

algorithmic redistricting is possible ... but its value and impacts are not clear

one-size-does-not-fit-all



other factors are important but hard to operationalize

vra compliance

defining and preserving communities-of-interest

concordance with other legal constraints

thank you!



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