

Written Testimony by Eliot Aretskin-Hariton
Submitted to the Ohio Redistricting Commission
9/12/2021

Co-chair Sykes, Co-chair Cupp, and members of the Ohio Redistricting Commission,

Thank you for letting me address you today. My name is Eliot Aretskin-Hariton. I live in Rocky River Ohio in House district 16 and Senate district 24. I am an aerospace engineer by trade and over the last few years I have specialized in mathematical optimization. But don't worry, I'm not here to give you a math lecture, I am here to discuss how the committee can move forward to find consensus, using the proposed senate map submitted by Senate President Matt Huffman. I am sure everyone will agree with me when I say that we would prefer to see 10-year maps. I want to talk about the process of modifying the map presented by the committee so that we can get to a 10-year senate map. Specifically I want to give you an example of actions that the minority and majority parties on the committee can take to reach consensus.

The process of dividing Ohio into senate districts can be reasonably compared to the process of fairly dividing a cake. Fair cake cutting is a well studied problem in mathematics and game theory. The specific method I want to direct your attention to is called "I cut, you choose" or "Divide and choose". The simplest explanation of this method is trying to divide a single cake amongst two people. The first person cuts the cake, and then the second person gets to choose which of the two pieces to eat. The person that cuts has an incentive to ensure that the pieces are equal, otherwise they might get a smaller piece of cake. This is the same method that Abraham and Lot used to divide grazing land in the story of Genesis. Most importantly, this method is provably fair. In a paper written by mathematicians Wesley Pegden et al. titled "*A partisan districting protocol with provably nonpartisan outcomes*,"¹ they proved that this process is fair and that no party has an advantage. I am going to show you how we can apply this method to reach consensus on the Ohio senate maps.

A simplified representation of Ohio can be seen in the figure below. We are going to represent the Republican proposed senate map by using the red marker to cut the

¹ <https://arxiv.org/abs/1710.08781>

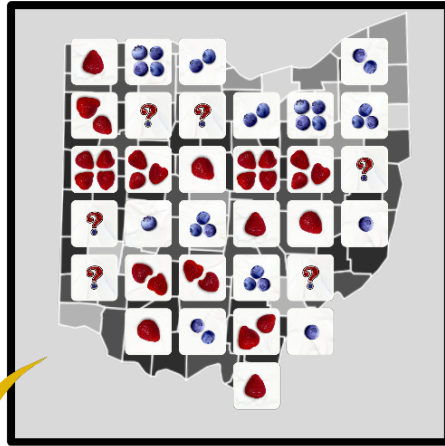
map into districts. Using the “I cut, you choose” principle, the Democrat committee members should select one of the proposed districts to accept. We will represent this district by highlighting it in blue. Then the Democrat committee members should use the remaining parts of Ohio that have not been selected and re-draw all the districts to their choosing. We will represent these new cuts using the blue lines. This new map now represents the democratic counter-proposal to the original maps. At this point, the Republicans should select one of the remaining districts to accept, shown as the district highlighted in red. This back-and-forth cutting and choosing process continues until every bit of our Ohio cake is included in a district and no more cuts are possible. The results from this process is neither a Republican map, nor a Democratic map. The final map is a fusion of what both parties want from the redistricting process.

Our society is built on structured competition and mutually beneficial cooperation. We don't always know how to implement these things, but civilization as we know it wouldn't exist without them. “I cut, you choose” is a provably fair method to achieve compromise between the proposed maps from the two major parties. While I did specifically propose that you use this process for the revision of the Ohio senate map, it could equally be applied to the Ohio house map as well. The rules are extremely simple, and the process is immediately implementable. I believe this represents the best chance at producing maps that both parties can reluctantly accept for 10-years. In optimization we call this “satisficing”, you don't get everything that you want, but you get an acceptable result for both parties.

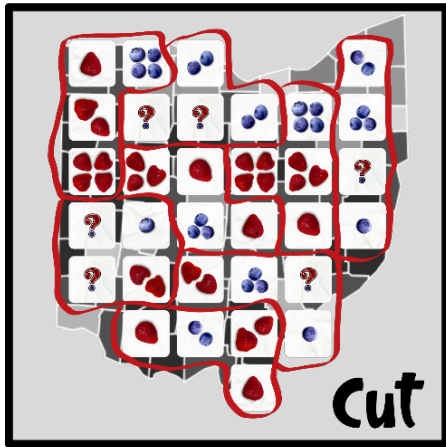
Thank you for your time.

-Eliot Aretskin-Hariton

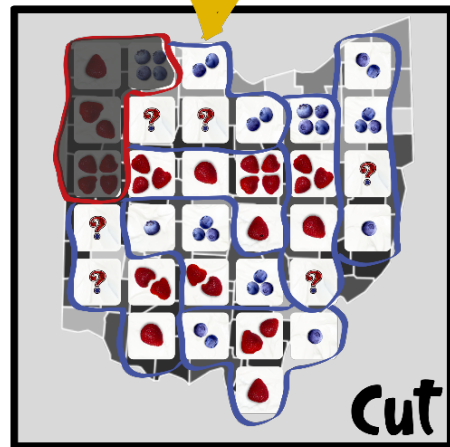
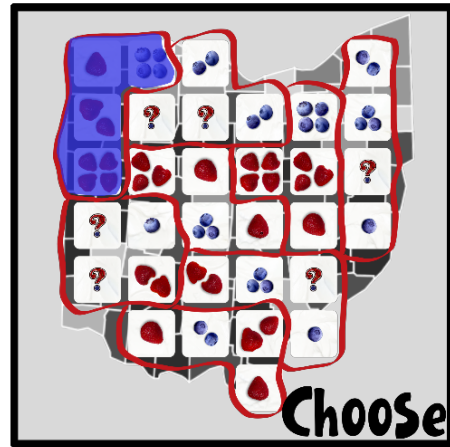
Ohio



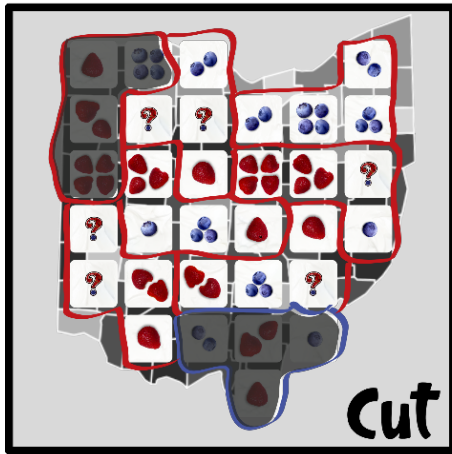
Republicans



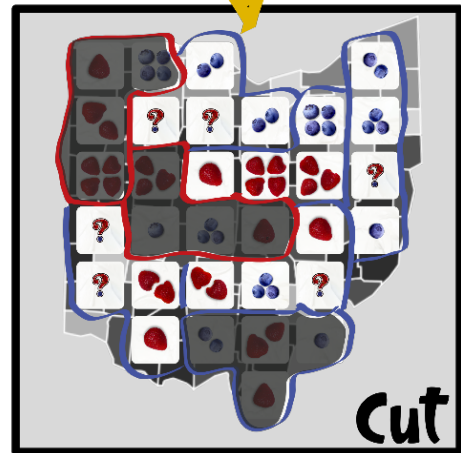
Democrats



Republicans



Democrats



Constraints Satisfied

