The Complexity of Voter Partition in Bucklin and Fallback Voting: Solving Three Open Problems

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Electoral control models ways of changing the outcome of an election via such actions as adding/deleting/partitioning either candidates or voters. These actions modify an election's participation structure and aim at either making a favorite candidate win ("constructive control") or prevent a despised candidate from winning ("destructive control"). To protect elections from such control attempts, computational complexity has been used to show that electoral control, though not impossible, is computationally prohibitive. Recently, Erdélyi and Rothe [2] proved that Brams and Sanver's fallback voting [1], a hybrid voting system that combines Bucklin with approval voting, is resistant to each of the standard types of control except five types of voter control. They proved that fallback voting is vulnerable to two of those control types, leaving the other three cases open.

We solve these three open problems, thus showing that fallback voting is resistant to all standard types of control by partition of voters—which is a particularly important and well-motivated control type, as it models "two-district gerrymandering." Hence, fallback voting is not only fully resistant to candidate control [2] but also fully resistant to constructive control, and it displays the broadest resistance to control currently known to hold among natural voting systems with a polynomial-time winner problem. We also show that Bucklin voting behaves almost as good in terms of control resistance. Each resistance for Bucklin voting strengthens the corresponding control resistance for fallback voting.

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References

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