Electoral Reform in Utah and the United States: Steps to Representative, Accountable, and Competitive State and Federal Government

By Oakley B. Gordon

In a state and nation in which faith in government is eroding, and politics are dominated by either partisan supermajorities (in Utah) or ideological stalemate (in Congress), there is an increasingly clear need to reform the system at its roots. The adoption of a more competitive, accountable, and representative electoral system would help address the problems which are endemic to our current legislative process. Specifically, three-member districts, in which representatives are elected through a modified form of single transferable voting, would best fit the needs of our state and nation. The new voting method would cause both legislatures to more closely represent the electorate, while the relatively small number of seats per district would maintain high levels of accountability and local representation.

With a Congress plagued by partisan deadlock and a state legislature dominated by a single party, voters in Utah and America suffer from dysfunctional electoral systems. At the center of these systems, enjoying “safe” districts in which reelection is all but guaranteed, are the legislators and their leaders, who have few systemic incentives to compromise and serve the electorate at large. Through gerrymandering, incumbents are able to exploit the structural weakness of the system to both secure their own reelection and ideologically distance the legislative bodies farther away from the views of the voters. The result is a system which is hardly representative, accountable, or contestable.

The shortfalls of our electoral system can be seen in the 2012 election of our state and national legislatures. In Utah, Republicans received 64% of the total vote in contested races of the Utah State House of Representatives. With this share of the vote, however, Republicans won 77% of the contested House seats (State of Utah, 2012). On the Congressional level, Democratic candidates for the U.S. House of Representatives received, in total, 550,000 more votes than Republican candidates, yet the GOP was able to retain its majority in the House (Thinkprogress.org, 2012). This is not, by any means, a condemnation of the Republican Party; Democrats can and have enjoyed unfair results in their own favor. Instead, these results show a fundamental problem with state and national legislative elections, which can only be addressed by changing the very electoral system in which our representatives are selected.

While electoral systems are rarely changed, they are usually only established in statutory ink, rather than constitutional stone. Consequently, many different electoral systems have been used throughout America’s history. This article makes a case for changing the electoral system once more. Specifically, it argues for reforming the elections of the Utah State House of Representatives and the United States House of Representatives. Both institutions are elected through the same plurality-based single-member district system, creating unrepresentative results on both levels and a common need for similar reform.

The U.S. Senate, being elected in a constitutionally different manner and addressing separate representative prerogatives, is not discussed in this article. While the U.S. Senate has evolved from an indirectly elected to a directly elected body, the prerogative of senators remains to represent their states at large, rather than according to ideological or geographical divisions therein. With each state electing their two senators on different years, no fair alternative to at-large representation of each state in the U.S. Senate exists. Furthermore, the very nature of Senate rules suggest that both the Founding Fathers and their successors meant for the Senate to be a place for majority consensus building, rather than lively debate between minority interests (Federalist Papers 62, 1788). This is seen in the constitutional requirement of a two-thirds vote in the Senate for many actions, as well as the development of the filibuster and the three-fifths vote required to invoke cloture. Thus, both before and since the Seventeenth Amendment, the role of the Senate has always been more to pacify, rather than represent, the multitude of passions in the electorate. The Utah State Senate, as somewhat analogous to its federal counterpart, is a body of deliberation, meant to cool the fervor of the electorate. The Senate is an “additional impediment...against improper acts of legislation” (Federalist Papers 62, 1788). Therefore, proportionality, the main criterion by which this article judges electoral systems, is of less concern for both the state and federal senates. This article will, therefore, focus solely on the United States and Utah Houses of Representatives, the democratic cornerstones of our national and state governments, tasked by
history and their very names to represent the members, opinions, and convictions of the electorate.

The premise of this article is that the electoral system used to select our representatives should produce results which more closely reflect the electorate, enable voters to hold their government accountable, and produce incentives for all parties to win as many votes as possible. The goal is to determine what changes to our electoral system will best satisfy these goals. This article will first define three different voting methods for reference. Then, representation, accountability, and contestability will be defined and quantified. Finally, a comprehensive set of changes will be proposed, including an alteration to the conventional form of the suggested voting method.

**VOTING METHODS**

The three types of voting methods considered by this article are plurality-based single-member district systems (SMD), party-list systems, and single transferable voting systems (STV). A voting system is the method through which voters express their preferences and by which those preferences are translated into results. Voting systems, as used by this article, should not be confused with the machines and logistics with which ballots are cast and counted physically nor with campaign regulations and traditions which together make up an electoral institution as a whole.

**SINGLE-MEMBER PLURALITY-BASED ELECTIONS**

In an SMD election, each voter is represented by one, and only one, representative. Each voter casts one vote for only one candidate. The candidate receiving the most votes is elected. This is the system which is used in the Utah State Legislature, as well as in Congress. Closely related systems, in which voters may cast multiple votes or in which a majority is required to elect the winner, are more rare but can be considered part of this category as long as only one representative is elected per district. The election of most executives, such as governors and mayors, can also be classified as SMD elections.

**PARTY-LIST SYSTEMS**

In a party-list system, each voter casts one vote for one party, rather than a candidate. The seats are then awarded to the parties in proportion to the share of the vote which they received. The method by which the results are rounded, in order to give each party a whole number of seats, is important and merits brief discussion, because different methods of rounding, each seemingly fair, can yield different results. The two most intuitive types of rounding are largest-remainder methods and quotient methods, the formulas of which are given below:

1. **Largest-Remainder Method of Rounding in Party-List Systems**
   
   \[ n_i = \frac{v_i \times N}{V} \text{, rounded, where } v_i \text{ is each party's votes cast and } N \text{ is the total number of seats.} \]

2. **Quotient Method of Rounding in Party-List Systems**
   
   \[ n_i = \frac{(v_i \times N)}{(V + D)} \text{, rounded, where } D \text{ is a controllable variable.} \]

**SINGLE TRANSFERABLE VOTING**

The final voting method considered by this paper is single transferable voting. In brief, it is a mirror of the party-list system. Unlike the party-list system, however, single transferable voting is candidate-centric rather than party-centric. This allows voters to express favor for candidates from different parties and independent candidates based upon the merits of the individual rather than the party. In the party-list system, a party is awarded more seats as their share of the vote increases. An individual, however, can only receive zero or one seat, which raises the question of how to avoid extra votes being wasted on a candidate who already has enough votes to be elected. Single transferable voting provides a clever solution by using ranked ballots and transferable votes.

**Figure 1. Single Transferable Voting**

**Figure 2. Ballots cast in Examples 1, 2, and 4**

In Examples 1, 2, and 4, 24 hypothetical voters cast ranked ballots indicating their preference of Candidates A, B, C, D, E, and F from most-preferred to least preferred. For the sake of explanatory simplicity, this set of ballots has a high level of overlap between the voters’ preferences, resulting in only nine permutations of candidates. This table shows the number of voters who ranked the candidates in the same order.

<table>
<thead>
<tr>
<th>Voters (24 Total)</th>
<th>Ranking of Candidates A, B, C, D, E, and F on ballot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C, A, B, E, D, F,</td>
</tr>
<tr>
<td>2</td>
<td>C, A, B, E, D, F,</td>
</tr>
<tr>
<td>3</td>
<td>C, A, B, E, D, F,</td>
</tr>
<tr>
<td>4</td>
<td>C, A, B, E, D, F,</td>
</tr>
<tr>
<td>5</td>
<td>C, A, B, E, D, F,</td>
</tr>
<tr>
<td>6</td>
<td>C, A, B, E, D, F,</td>
</tr>
<tr>
<td>7</td>
<td>C, A, B, E, D, F,</td>
</tr>
<tr>
<td>8</td>
<td>C, A, B, E, D, F,</td>
</tr>
<tr>
<td>9</td>
<td>C, A, B, E, D, F,</td>
</tr>
</tbody>
</table>

Under the quotient method, results can either be rounded up, down, or to the nearest whole number. Rounding down is generally preferred because it favors larger parties, thereby creating an incentive for smaller parties to unite. In practice, the D’Hondt method of rounding, which produces the same results as the described quotient system, is used instead (Balinski and Young, 2001).
Example 1. Electing One Candidate with Single Transferable Voting

Premise: 24 voters elect one candidate from a selection of six candidates (Candidates A, B, C, D, E, and F). Their ranked ballots are shown in Figure 2. The quota of votes required to be elected is set at 13 (a simple majority).

Step One: All votes are distributed to their most-preferred candidates. No candidate has reached the quota of 13 votes, so no candidate is elected.

Step Two: Candidate F, who has the least amount of votes, is eliminated. His vote is transferred to his supporter’s next-preferred candidate, Candidate D. No candidate has reached the quota of 13 votes, so no candidate is elected.

Step Three: Candidate E, who has the least amount of votes, is eliminated. His votes are transferred to his two supporters’ next-preferred candidate, Candidate A. No candidate has reached the quota of 13 votes, so no candidate is elected.

Step Four: Candidate C, who has the least amount of votes, is eliminated. Each supporter of Candidate C has their vote transferred to their next-preferred candidate. Thus, Candidates A, B, and D each receive a transferred vote. No candidate has reached the quota of 13 votes, so no candidate is elected.

Step Five: Candidate B, who has the least amount of votes, is eliminated. All votes counting toward B have Candidate D listed as their next-preferred candidate. Therefore, Candidate D receives six transfer votes, for a total of 15 votes. Candidate D has crossed the quota and is elected.
Example 2. Electing Four Candidates with Single Transferable Voting

Premise: 24 voters elect four candidates from a selection of six candidates (Candidate A, B, C, D, E, and F). Their ranked ballots are shown in figure 2. The quota of votes required to be elected is set at five, the smallest whole number of votes that can be obtained by no more than four candidates.

Step One: All votes are distributed to their most-preferred candidates. Candidates A, B, and D all receive at least five votes in this manner, and are elected thusly.

Step Two: Candidate A is the furthest above quota, so his surplus of three votes is transferred to his supporter’s next-preferred candidates. Half of his supporters list Candidate B as their next-preferred candidate, while the other half list Candidate E as their next-preferred candidate, so each receives half of the transferred surplus. No additional candidate reaches the quota from the transfer, so no fourth candidate is yet elected.

Step Three: Candidate B is now the furthest above quota, so his surplus of three votes is transferred to his supporter’s next-preferred candidates. All votes counting toward Candidate B list Candidate F as their next-preferred candidate, so Candidate F receives the entirety of Candidate B’s surplus. No additional candidate reaches the quota from the transfer, so no fourth candidate is yet elected.

Step Four: No candidate is now above the quota, so the candidate with the fewest votes, Candidate F, is eliminated. All votes counting toward Candidate F list Candidate D as their next-preferred candidate, so Candidate D receives the entirety of Candidate F’s votes. No additional candidate reaches the quota from the transfer, so no fourth candidate is yet elected.

Step Five: Candidate D is now the furthest above quota, so his surplus of three votes is transferred to his supporter’s next-preferred candidates. Of the nine votes counting toward Candidate D, eight list Candidate E and one lists Candidate B as their next-preferred, so Candidate E receives 89% of Candidate D’s surplus, while Candidate B receives 11%. This transfer brings Candidate E to the quota, electing him as the fourth and final winner.
In this system, voters rank the candidates from most-preferred to least-preferred. From the number of votes cast and the number of seats to be elected, a required quota of votes needed for victory is determined. Each voter’s ballot is cast for his or her most-preferred candidate. If any candidate reaches the quota, then the candidate is elected. A victorious candidate’s surplus of votes is then transferred to their voters’ next-preferred candidates. For instance, if a candidate has twice as many votes as needed to win a seat, then half of each of the ballots counted toward the candidate are transferred. If there are no surpluses to transfer, then the candidate with the least amount of votes is eliminated and their ballots transferred entirely to their voters’ next-preferred candidates. Surpluses are transferred and candidates are eliminated until the set number of winners has been reached.

The quota ensures that each candidate who is elected represents a given and unique share of the electorate (e.g., a quota of 34% of the votes cast would ensure that each elected candidate represents one third of the electorate). The quota is directly related to the number of seats being elected. For instance, a quota of 34% of the votes cast would elect only two winners because votes could be transferred until two candidates are elected, but no more than two candidates can represent separate and unique shares of 34% of the vote. Reversely, a given number of seats can be produced by an interval of possible quotas. To elect one candidate, the quota can be set at any value greater than half of the votes cast (i.e., a majority). To elect two candidates, the quota can be set at any value greater than one third of the votes cast and less than or equal to one half of the votes cast.

In summary, single transferable voting does two things. First, it ensures that each elected candidate represents a unique and equal share of the electorate. Thus, the elected candidates together represent the electorate at large in an accurate manner. Second, it minimizes wasted votes. This is to say that, by ranking more than one candidate on their ballot, voters need not worry about casting, and thereby wasting, their ballot either for candidates who already have enough support from other voters or for candidates who are not popular enough to be elected. If a voter’s most-preferred candidate does not need or cannot be helped by their support, then their vote will be transferred down the list until it reaches a candidate whom it can help.

EXCLUDED SYSTEMS

Not discussed in this article are highly disproportional systems, such as those in which multiple representatives are elected by majority, rather than proportional, vote. Complex hybrid systems, such as mixed-member parallel and mixed-member compensatory systems, are also not discussed because the complex nature of these hybrid systems makes them difficult to analyze and compare. The complexity of hybrid systems is not necessarily disqualifying, for the adoption of single transferable voting in local and national elections around the world demonstrates that voters can function under more complex systems. Indeed, it is the simplicity of many systems that yields unfair electoral results. Simple plurality elections, especially of multiple representatives in the same district, are perhaps the least complex voting systems, yet also the most unfair. But while simplicity is not sought by this paper, parsimony is. This paper sees hybrid systems, whether the at-large/district-tiered system of the Salt Lake County Council or the party-list/district system of the German Bundestag, as the results of abandoning the search of a better voting system by instead fusing two imperfect ones together. In addition to being conceptual failures, these hybrid systems can fail to correct their component system’s weaknesses. In the case of Salt Lake County, electoral districts are inflated by the at large, and in the case of national mixed-member legislatures, compensatory party seats fail to offset the disproportionalities of district elections (Carey & Hix, 2011). Therefore, this paper will only consider systems if the same method of election is used to elect all members of the representative body.

In the following sections, the criteria by which we can judge prospective electoral systems will be discussed. Having considered the advantages and disadvantages of different options, a detailed prescription for a new electoral system for Utah and the United States will be made.

CRITERIA AND DETERMINANTS OF A DESIRABLE ELECTORAL SYSTEM

This article argues that three criteria should be considered when creating and adopting a new electoral system: first, and most importantly, proportionality; second, accountability; and third, contestability. This means that the seats awarded should represent the votes cast, that majority coalitions should be voted into and out of power easily, and that parties should have an incentive to strive for as many votes as possible. Together, these criteria can be used to judge the merit of an electoral system. This article places the strongest importance upon proportionality due to the special lack and need thereof in Utah and American politics. This section will define, justify, and quantify the three criteria. The remainder of the section will discuss the causes of proportionality. The next section will then examine how legislative elections of the Utah and U.S. House of Representatives can be altered to increase the proportionality of their results, while maintaining or raising their levels of accountability and contestability.

DEFINITIONS AND JUSTIFICATIONS

Our primary criterion, proportionality, is a measurement of how closely the seats allocated by an election match the votes cast. In other words, proportionality is how similar the views in government are to the views of the people. Proportionality is a direct correlate of democracy; measured continuously, a fully proportional representative body is fully democratic. Categorically, as put by John Stuart Mill (1861), the difference between “representation of all and representation of the majority only” is the difference between “true and false democracy”:

In a representative body actually deliberating, the minority must of course be overruled; and in an equal democracy (since the opinions of the constituents, when they insist on them, determine those of the representative body) the majority of the people, through their representatives, will outvote and prevail over the minority and their representatives. But does it follow that the minority should have no representatives at all? Because the majority ought to prevail over the minority, must the majority have all the votes, the minority none? Is it necessary that the minority should not even be heard? Nothing but habit and old association can reconcile any reasonable being to the needless injustice. In a truly equal democracy, every or any section would be represented, not disproportionately, but proportionately. A majority of the electors would always have a majority of the representatives; but a minority of the electors would always have a minority of the representatives. Man for man they would be as fully represented as the majority. Unless they are, there is not equal government, but a government of inequality and privilege: one part of the people rule over the

---

2 As transfers are made from one victorious candidate to another, it is possible for the sum of all surpluses to approach, but fail to ever reach, zero. This produces an infinite loop, in which smaller and smaller transfers are made between victorious candidates. This can be avoided by only transferring surpluses greater than or equal to one. For example, if the quota to be elected is 34 votes, then no candidate would have their surplus transferred unless they had 35 or more votes.
rest: there is a part whose fair and equal share of influence in the representation is withheld from them; contrary to all just government, but, above all, contrary to the principle of democracy, which professes equality as its very root and foundation. (Mill, Chapter 7)

Our secondary criteria are accountability and contestability. Accountability means the ability of voters to understand how their vote will ultimately impact the resulting government. A system with high accountability is one in which factions have coalesced into several political parties, each of which appeals to a wide range of voters. With few parties, voters better understand how their ballot will affect the resulting governing coalition in the legislature. An unaccountable system is fractious, with many parties appealing to narrow selections of voters. With a fractured party system, voters have difficulty predicting how their ballots will affect the legislative coalition and, therefore, are less able to hold their government accountable (Strom, 1990). For example, in a system with five parties, requiring coalitions to achieve majorities in government, it would be difficult for a voter to vote for or against the governing coalition because it would be hard to know how each party would align itself in the new government.

Finally, contestability is our final criterion. In a broader sense, it refers to the very foundation of democracy as a system of electorally contested power. In our narrower sense here, it means the incentive each party, whether majority or minority, has to increase its share of the total vote. If an increase in the number of votes received will clearly result in an increase in the number of seats won, then the system has high contestability. A good democratic system is one which encourages and rewards those who seek and receive a greater share of the vote. For instance, a gerrymandered “safe” district is less contestable, because neither side has an incentive to engage more voters; the majority party is already expecting victory and the minority party knows that swaying even a significant share of the electorate is unlikely to yield a victory on Election Day. Democracy is based upon competition and participation, but neither can exist without a contested campaign over an uncertain outcome.

**QUANTIFICATION**

Quantifying proportionality, accountability, and contestability can, for the purposes of this article, be problematic. Starting with proportionality, we have two choices. First, we can use the common Gallagher Index (Gallagher, 1991), which uses a least-squares method to determine how closely the share of votes received by the parties matches the share of seats won by the parties. Alternatively, we could create a formula predicting whether or not the electoral system will select the Condorcet set, adjusted by the number of seats elected. In a single-winner election, the Condorcet candidate is the candidate who would defeat any other candidate in a one-on-one election. A single-winner election can be “spoiled” if a third candidate receives votes from those who support the Condorcet candidate (e.g., a conservative district may elect a liberal if two conservatives are on the ballot). Regardless of how many votes or first-place ranked ballots a winner receives, the best winner is always the Condorcet candidate, who would have defeated the winner if no other candidates had been on the ballot. Protecting against the spoiler effect is a key aspect of proportionality.

The Condorcet candidates in a multiple-winner election are those candidates, who, as a set equal in size to the number of seats elected, better represent the electorate at large than any other set of winners. The Gallagher Index works well in systems which are party-centric, but it fails to adequately account for independent candidates and preferences of voters for specific candidates within parties (Tideman & Richardson, 2006). A Condorcet-based metric works well for candidate-centric systems, but cannot be used to quantify system-wide proportionality when districts are used.

To measure accountability, one would use an inverse measurement of political fragmentation, the number of political parties per seat (Laasko & Taagepera, 1979). As discussed above, a fractured party system makes it difficult for voters to vote against or in favor of majority coalitions. In a two-party system, a vote for the party in power will help keep that party in power, while a vote for the opposition will help shift power to a new party. In coalitions, resulting from multiple parties, it is hard to give blame or credit to a party within the coalition, or to predict what role a party will play in forming the next coalition or opposition. Therefore, as the number of parties increases, the accountability of the system decreases.

Contestability, however, would need to be determined logically, rather than mathematically. If a stable equilibrium of seat distribution between parties occurs in which no party can reasonably expect to gain more seats by expanding its vote share, then there is low contestability. If both majority and minority parties, however, have a reasonable expectation to increase their own number of seats by contesting a seat held by another party, then there is high contestability.

Unfortunately, for our purposes, all three criteria must be considered on a conceptual level, rather than a quantifiable one. Proportionality cannot be compared absolutely between systems in which voters face entirely different types of decisions, such as whether they must choose between parties or candidates. Similar barriers face attempts to make quantifiable comparisons of the accountability and contestability of different systems. Therefore, we are limited to logical, rather than strictly mathematical, examinations of what increases or decreases proportionality, accountability, and contestability.

**DETERMINANTS OF PROPORTIONALITY**

The remainder of this section will examine the factors which determine proportionality so that the next section may prescribe a more proportional system. Our dependent variable, the expected proportionality of an electoral system, is an effect of several predictors. Variables outside of the system itself, such as voter rationality, type of voting machine, and even campaign regulations, are assumed to be constant for the purposes of this paper. This leaves us with four systemic independent variables when examining individual elections: the number of candidates and parties, the number of voters, the voting method, and the number of seats being elected.

The number of candidates and parties can be eliminated from our variables because we can assume that rational actors will follow systemic incentives to seek or not seek office or to join a coalition or party prior to the election, as predicted by Duverger’s Law (Duverger, 1963; Riker, 1977). Thus, the number of candidates and parties will not have independent variance, but can instead be predicted to be the same when all other independent variables are the same. Finally, we can assume that the number of voters in an election will always be sufficiently large enough for any variance in voter quantity to have a negligible effect upon proportionality. The addition of each voter comes with diminishing losses to proportionality because the increase in voters leads to an increased overlap of ideology and opinion between voters, thereby allowing one representative to speak for a larger share of the electorate. Consequently, a body of 100 legislators could
be expected to proportionally represent the full political spectrum within an electorate of 10,000 voters almost as well as it could represent the full political spectrum of an electorate of 1 million voters. With the number of candidates, parties, and voters eliminated from our model, we are left with only the voting method and the number of elected seats as our independent variables for predicting proportionality of electoral systems.

AGGREGATION OF PROPORTIONALITY

Before determining which number of seats and voting method will optimize proportionality for both Utah and the United States, we must first appreciate one more level of complication concerning electoral systems and the proportionality of their results. The electoral systems of the Utah and the United States Houses of Representatives are not conducted as at-large elections. Instead, each is an aggregation of many district elections (75 in the House election in Utah and 435 in Congress). The proportionality of a legislative electoral system is a comparison of the aggregate votes cast and the aggregate results determined. To examine the proportionality of the United States House of Representatives, for instance, one would compare the number of votes cast for each party nationwide to the number of congressional seats won by each party. This reveals that the 2012 elections of both the Utah State House of Representatives and the United States House of Representatives favored Republicans over Democrats, relative to the number of votes received by each party. Aggregate proportionality will not always be the same as the proportionality of its districts, unless there is only one at-large district.

In some cases, disproportionality at the district level sums to a greater level of disproportionality at the aggregate level. An extreme hypothetical example of an election of 100 legislators in single-member districts, one party receives a bare majority of the vote in 51 districts and no votes in the remaining 49 districts, while the second party receives all other votes cast. All 100 districts have high proportionality, with 75% of the voters having cast their ballot for the legislator who represents them. Yet, at the aggregate level, 51% of the legislators were elected by only 25% of the electorate.

Aggregation allows us to create a definition of gerrymandering and understand how and why it is a problem for Utah and Congress. We can define gerrymandering as the act of intentionally drawing district boundaries to increase the odds of disproportionality being greater on the aggregate level than on the district level. Therefore, if proportionality is seen as a virtue of representative government, then gerrymandering is a malicious attempt to undermine it.

The aggregate proportionality of an electoral system will not always be less than its districts’ average proportionality. To allow for such a possibility, one must consider that if voters did not support a winner in their own district, they supported and feel represented by a winner from another district, they supported and feel represented by a winner from another district, they supported and feel represented by a winner from another district, they supported and feel represented by a winner from another district. Under this surrogate interpretation of representation, voters for losing candidates in different districts can be considered as exchangeable for the purposes of calculating aggregate representation. The resulting aggregation will show a more proportional result for the entire legislature than if candidates of the same party were not treated as interchangeable. The surrogate model can even yield aggregate results which are more proportional than any of the district results. For example, if two parties compete for 100 seats under an SMD system, with “Party A” winning an exceptionally bare majority in 50 districts and “Party B” winning an exceptionally bare majority in the remaining 50, then the district proportionality will be low, with only 50% of all voters supporting the candidate who represents them. On the aggregate level, however, the proportionality is high, with the ratio of seats between parties being perfectly proportional to the support of each party in the electorate.

While results can be as proportional or more proportional on the aggregate level as compared to the district level, the electoral system itself can only be considered proportional if it is expected to return proportional results for a wide range of voter preferences and wide range of geographical distributions of voter preferences. In the last example above, two parties, each with half of the total vote share, receive half of the seats. Yet in this seemingly proportional electoral system, the aggregate proportionality decreases with small changes to the votes cast. Furthermore, changes in the electorate have different effects upon the seats awarded depending upon which district has the shift of voters. For instance, a shift of a small number of voters from Party A to Party B could: have no impact on the legislature, if the voter shift occurs solely in districts in which Party B already had a majority; or have a moderate impact on the legislature, if the voter shift occurs in a district which would have otherwise elected a candidate from Party A; or deliver the entire legislature to Party B, if the voter shift occurs in every district which would have elected Party A. Thus, a distributed electoral system may be able to produce proportional results on the aggregate level in certain circumstances, but that does not mean that the system can create proportional results for different sets of voter preferences or for different distributions of voters across its electoral districts.

With district magnitude (seats per district) and voting method already established as the determinants of district proportionality, we add the number of districts as our third and final determinant of the proportionality of the electoral system as a whole. Three of these factors can be changed to the benefit or detriment of a democracy. The following section will discuss how each should be changed to improve our political culture on the state and national level, while considering the potential impact of such changes on accountability and contestability.

SUGGESTED CHANGES TO LEGISLATIVE ELECTORAL SYSTEMS

In the previous section, this article established three criteria (proportionality, accountability, and contestability) upon which an electoral system should be judged and three shared determinants of the same criteria (voting method, district magnitude, and number of districts). This section will propose specific qualities and quantities of each determining variable to create a better electoral system for both the Utah and the U.S. Houses of Representatives. First, the ideal district magnitude (seats per district) shall be determined by examining proportionality, accountability, and contestability under varying magnitudes with given voting methods. With the total number of seats in both legislative bodies as a given, the district magnitude will determine the number of districts for both houses. With the ideal district magnitude and the number of districts determined, a voting method will be chosen from the three candidates: single-member district (SMD), party-list voting, and single transferable voting (STV). Finally, having concluded that STV elections in low-magnitude districts are best for the needs of the state and nation, a unique alteration to regular STV voting will be proposed. The alteration is tailored to address losses of functionality when the number of candidates greatly exceeds the number of seats in STV systems.

DISTRICT MAGNITUDE

When determining the proposed district magnitude, four ranges should be considered: single-member districts, two-member districts, low-magnitude (three to five) districts, and high-magnitude (eight or more) districts. Because we can expect the proportionality, accountability, and contestability of districts in the same range to be equal, and all other variables held constant,
the high-magnitude districts considered by this article will be statewide at-large elections of either the state legislature or the congressional delegation. Proportionality increases with district magnitude, as each new representative brings voice to a fraction of the district that had not been represented. Accountability, however, decreases as district magnitude increases, due to a proliferation of smaller parties as narrower fractions of the electorate gain control of seats. Contestability has a much less simple relationship with district magnitude.

First considering single-member districts, we must realize that the three of our voting methods are all the same when electing one person. In a traditional SMD election, such as the ones used to elect our members of Congress and state representatives, whichever candidate receives the most votes wins the seat. In a party-list system in which only one person is elected, the process of calculation is more difficult, but the result is the same. In such a situation, the one-to-one relationship between party and candidate means we can treat the two as one and the same. In the party-list candidate of one seat, each voter would cast a vote for one candidate, as they would in an SMD election. Rather than give the seat to the candidate with most votes outright, either a largest remainder method or a quota method would be used to determine which candidate receives the seat. Under the former method, no candidate would receive the seat under the initial allocation of seats (100% of the vote would be required), but the candidate with the most votes (the largest remainder) would receive the seat in the second allocation. Under the quota method, the quota would be adjusted until the candidate with the most votes, and only the candidate with the most votes, received the seat. Single transferable voting also mimics SMD when one seat is at stake, but it acts as an instant runoff, rather than a simple plurality election, as candidates are eliminated and votes are transferred until one candidate has a majority of the vote. Therefore, SMD is not so much its own system, but rather an intersection of other voting systems when district magnitude is one.

Single-member districts have the highest accountability. The political system becomes dichotomous as parties join together to defeat their rivals in each district (Duverger, 1963; Riker, 1977), until only two or three parties remain. Therefore, it is easy for a voter to understand how their vote helps or hurts the incumbent representative and overall legislative majority, which keeps the government tightly accountable to its people. The proportionality of single-member districts, however, is exceptionally low. Using either the Gallagher Index to measure the party-based aggregate proportionality or the candidate-based Condorcet metric introduced earlier in this article, proportionality is low when district magnitude is one. The 2012 election of the Utah House of Representatives, for example, scores 13 on the Gallagher Index, a high value which means that Republicans received about 13% more of the total seats than they proportionally earned (State of Utah, 2012). Such disproportional results are expected in single-member districts because it is unlikely for the party system to fracture merely by dividing districts in half or merging them together by groups of two. They are also much more proportional than single-member districts. In fact, increasing district magnitude from one to two produces the largest marginal increase in proportionality (Carey & Hix, 2011). Gerrymandered districts in SMD, designed to give one party a safe majority in each race, can return one candidate from each party in two-member districts. Depending on the exact voting method, assuming that no third parties or independent candidates become competitive, one party would have to cross at least the two-thirds threshold of total votes to win both seats in a two-member district. A district of this magnitude, one would imagine, would become very stable. Each party would win one seat in each district, while the other party won the other. The number of votes required to win both seats in a district would most likely be too high to warrant the effort of a party running two candidates, thus resulting in a stable equilibrium. But this hypothetical equilibrium is precisely why two-member districts fail to meet our crucial third criterion, contestability. A system should not promote stalemate; rather, it should encourage competition. Additional seats need to be within graps of the parties, so that they constantly seek out, appeal to, and engage new voters. That is the lifeblood of democracy, and why one-member and two-member districts are a poor choice with any voting method.

The arguments against two-member districts can be made against all districts with a magnitude of an even number, albeit less strongly. With an odd number of seats in a district, the central seat is always contested between left and right. No stalemate is reached, because both sides must constantly compete for the odd seat. The fate of the odd seat itself is controlled by the median voters, while the remaining seats are safely in the hands of either side. This keeps moderate centric voters relevant, engaged, and ultimately in charge as partisans court their favor.

Having eliminated single-member districts as too disproportional and evenly-numbered districts as too uncontested, the remaining issue of district magnitude is whether to keep districts small or to expand them as widely as possible, thereby doing away with them completely in favor of at-large elections. The question is one of balancing increasing proportionality and decreasing accountability. Here we can turn one last time to Carey and Hix (2011), who find, through a survey of the world’s democracies, that smaller districts balance the two criteria better than large ones. They find that there are diminishing gains to proportionality as district magnitude increases, but that losses to accountability are almost linear. The diminishing returns to proportionality can be attributed to the decreasing share of the electorate which is not represented in the legislature by existing legislators. For each additional seat, there are fewer unrepresented voters to whom the new legislator can bring voice. Therefore, once a degree of proportionality has been achieved, at a magnitude of two or three, the costs of increased magnitude begin to outweigh the benefits.

From these considerations, we can conclude that three-member districts are ideal, followed by five-member districts, then, arguably, four-member districts. These magnitudes allow us to meet our criteria for proportionality, accountability, and contestability. Additionally, they allow representation to remain somewhat local, thereby preserving our tradition of keeping the government close to the people.

DISTRICTING

With ideal district magnitude settled at three, we can address the second determinant of our electoral system’s overall quality: the number of districts. If we assume that the number of seats in the Utah House of Representatives (75) and the size of each congressional delegation (four, in Utah’s case) are given, then the number of districts becomes a given as well. For the Utah State House of Representatives, 25 districts would be created, each with three seats and an equal number of voters.

On the congressional level, however, districting would become more complicated because not all delegations are divisible by three. We must accept that neither every state nor every district will be able to have solely three-member districts. A system can, however, be established to keep each congressional district magnitude as close to our desired value as possible. First, in each state with fewer than six members of Congress, the entire delegation will be elected together in an at-large district. Thus, the only instances in which the least-desirable district magnitudes—one and two—are used are when states only have one or two members of Congress. Second, in states with seven members of Congress, the state shall be split into two districts—one with three members and one with four members. Finally,
and most parsimoniously, all other states shall be divided into three-member districts; states that have delegations that are not divisible by three shall have one or two five-member districts as necessary. The population distribution between the districts within each state shall be proportional to the number of seats in each district.

VOTING METHOD - GENERAL

By adopting three-member districts, we also reject SMD elections, which by name and definition require single-member districts. This leaves us with two remaining voting methods (party-list and single transferable voting) which we shall judge by our three criteria: proportionality, accountability, and contestability. Both systems are equally proportional and contestable. Given a number of seats, a share of the electorate can expect to win the same share of the seats under either system. Both are highly contestable as well, as parties are rewarded with more seats for receiving more votes in both party-list and STV elections.

Thus, the choice between party-list and STV elections must be based upon accountability and even cultural norms. Party-list voting is a party-centric system. It is founded upon the assumption that parties, not individual candidates, are the primary actors in legislatures and, therefore, that the voters’ main choice is that of which party to support. STV, however, is candidate-centric. Through STV, the voters rank and choose from candidates, including independents. The superiority of either system over the other may not be universal, but the candidate-centric ballots of STV are more familiar and more readily adoptable by a skeptical electorate in Utah and around the country. Additionally, candidate-centric elections allow voters to hold individual candidates within a party accountable, thereby allowing for precise accountability rather than broader party accountability. All other considerations being equal, candidate-centric representation and more precise accountability is enough to make STV, rather than party-list voting, the system recommended by this article.

VOTING METHOD – LIMITATIONS OF STV

The previous section argued that proportionality of a candidate-centric system is best measured by its likelihood of electing the Condorcet candidates. In other words, a system is fully proportional if it can guarantee an outcome which is more acceptable to the electorate than any other outcome. STV, like all easily understood voting systems, cannot guarantee the election of the Condorcet candidate. This subsection proposes several specific changes to the details of STV, which can be implemented to increase its probability of electing the Condorcet set, thereby creating more representative outcomes and preventing third parties from spoiling the election.

In some circumstances, a failure to elect a Condorcet candidate may not be the fault of the system, but of voter preference. It is possible that no candidate can beat each and every other candidate in a one-on-one match up. This can happen if the electorate's preferences are cyclical, meaning that every candidate who can receive a majority of the vote against second candidate will also fail to receive a majority of the vote against a third candidate. Cyclical preferences make it difficult for any electoral system to grant legitimate victory to any candidate, because no matter whom the system selects, there is another candidate whom a majority of the voters would prefer. Example 3 shows a hypothetical set of ranked ballots in which no candidate is a Condorcet candidate. Cyclical preferences represent an aggregation of individual choice into an irrational and paradoxical choice of the electorate. Such preferences would be unexpected in real life, in which candidates and voters usually align on a one-dimensional partisan continuum. For example, if Candidate A would beat Candidate B, and Candidate B would beat Candidate C, then it is likely that Candidate A would beat Candidate C. Additionally, we can only judge a voting system by how well it reflects the will of the electorate. If the electorate does not express a coherent joint preference through their ballots, then it is futile to judge the voting system by the results which it returns. Therefore, when discussing the limitations of electing a Condorcet candidate with STV, such limitations will only be discussed in the contexts in which there are Condorcet candidates to elect or fail to elect.

In both single-member and multi-member elections, STV fails to elect Condorcet candidates when the Condorcet candidate fails to obtain a substantial amount of first-choice votes. Such failures are not the result of extraordinary or unusual results, but of easily conceivable situations in which the widely-acceptable Condorcet candidates fails to garner many first-choice votes, if most voters list narrowly-appealing partisan candidates as their first choice. For example, a very widely acceptable moderate candidate could fail to receive more than a third of the first-choice votes in a three-way race against a staunch liberal and a staunch conservative if the partisan bases of the electorate dominated the election. If only one seat were being elected, the moderate Condorcet candidate would be eliminated in the first calculation, thereby electing a highly partisan candidate opposed by a large minority of the electorate. We can further suggest from this simple example that the chance of electing the Condorcet set decreases as the candidate-to-seat ratio increases. This is especially relevant to this article, because the proposed low-magnitude districts could conceivably have a relatively high number of candidates per seats elected.

Example 1 shows how STV can fail to elect the Condorcet candidate. In this election of one candidate out of six candidates running for office, Candidate B is the Condorcet candidate. Against any other candidate in a one-on-one match up, Candidate B would receive a majority of the vote (13-11 against Candidate A, 17-7 against Candidate C, 18-6 against Candidate D, and 13-11 against Candidate E). Regular STV, however, elects Candidate D, despite the electorate's clear preference for Candidate B.

<table>
<thead>
<tr>
<th>Number of Voters (100 total)</th>
<th>Ranking of Candidates A, B, and C, from Most to Least-Preferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>36---------------------------</td>
<td>A, B, C</td>
</tr>
<tr>
<td>36---------------------------</td>
<td>A, C</td>
</tr>
<tr>
<td>36---------------------------</td>
<td>C, B</td>
</tr>
<tr>
<td>36---------------------------</td>
<td>A, C</td>
</tr>
<tr>
<td>36---------------------------</td>
<td>B, C</td>
</tr>
</tbody>
</table>

In this example, 59 of the 100 voters prefer Candidate C over Candidate A, 52 voters prefer Candidate A over Candidate B, and 64 voters prefer Candidate B over Candidate C. In this odd "rock, paper, scissors" scenario there is not an obvious "right" winner, because no candidate can win in a hypothetical one-on-one contest against any and all other candidates.

VOTING METHOD – PROPOSED MODIFICATIONS TO STV

It is possible to alter the standard model of STV to give Condorcet candidates and sets a better electoral chance against less favorable candidates. First, one must look at the two main processes that determine the winners in an STV election: first, the transfer of surplus votes from victorious candidates; second, the elimination of candidates and the transfer of votes therefrom. Broadly speaking, the transfer of surplus votes from victorious candidates is a good thing for Condorcet candidates. Condorcet candidates can be
assumed to be relatively high on most voters’ ballots, as they are highly appealing to moderate candidates and favorable alternatives to opponents of the most partisan voters. Therefore, if a Condorcet candidate did not receive many first-choice votes, then he is likely to benefit from the transfer of surplus votes to the victor’s second and third place choices. Surplus transfers, therefore, can act as lifelines to Condorcet candidates with few first choice votes, helping them avoid early elimination.

The elimination of candidates, while necessary if there are no surpluses to transfer, comes with the risk of eliminating a Condorcet candidate. Condorcet candidates are especially vulnerable to elimination early in the calculation if they did not receive many first-choice votes. While Condorcet candidates will generally rank high on most ballots, they can fail to garner many first-place votes if candidates with a more narrow appeal target each section of the electorate. When elimination occurs before many surplus votes are transferred, Condorcet candidates are at their most vulnerable, facing the possibility of elimination while even the most unpopular candidates remain in the contest. In short, surplus transfers generally help Condorcet candidates, while eliminations, especially early ones, can hurt Condorcet candidates. A well-designed STV system should, therefore, ensure that more surplus votes are transferred prior to each elimination.

The only substantial way to increase surplus transfers is to decrease the victory quota, because a surplus transfer happens whenever a candidate has more votes than the victory quota. There are three basic ways to decrease the victory quota: increase the number of winners; change the formula which calculates the quota by increasing the divisor relative to the number of seats; and change the method with which the quota is applied. While the number of seats has already been set at three, the other two means of decreasing the victory quota can still be manipulated to increase proportionality.

With the number of winners set at three for most of our proposed districts, the method for calculating the victory quota must be established. The method must produce a quota small enough to produce enough winners, but large enough not to elect too many. A quota of 21%, for example, will always produce four winners because it is impossible for more than four people to win 21% and possible for four to do so. The simplest method is to divide the number of voters by the number of winners (i.e., if 100 voters elect three winners, then the quota is 33+1/3). This method produces the largest possible victory quota, known as the “Hare Quota.”

To produce the smallest quota for a given number of winners, the following equation must be used: (number of voters)/(number of winners + one), rounded up to the nearest whole number of votes. This quota and its derivatives go by a number of names, but the most common is “Droop Quota.” Because of its low value, thereby promoting surplus transfers, this quota is used by most voting systems which require a quota. It is also proposed by this article for the same reason.

There is not a current STV system that uses a quota smaller than the Droop Quota, because a smaller quota would increase the number of winners under basic STV rules. Even the Droop Quota can be too large to elect the Condorcet candidate or Condorcet set by eliminating them too early. It is, therefore, necessary to alter STV, so that lower quotas can be used, thereby helping Condorcet candidates. The altered form of applying the victory quota to STV, as proposed by this article, shall be called “exhaustive single-transferable voting” or “ESTV.” Rather than electing all of the desired number of winners at once, one candidate is eliminated at a time. This is done by first electing n-1 from “n” number of candidates, then by electing n-2 candidates from the remaining candidates, n-3 from the set of n-2, and so forth. For example, the election of three winners from five candidates would start with the calculation of four winners from the five candidates, and would end with the calculation of three winners from the four candidates elected from the original. This ensures that the quota is as low as possible (17% in this case, rather than 25% under the Droop Quota) at the beginning of the election, thereby allowing surpluses to flow to any Condorcet candidates who did not receive many first-choice votes.

Succinctly, the rules of exhaustive single transferable voting would be as follows (illustrated in Figure 3):

1. Eliminate “trivial” candidates, which are those candidates who appear on less than (voters/candidates) number of ballots. The elimination of these candidates through the normal process will be time-consuming and pointless because of their negligible chance to win in anything short of a miraculous election. The set of non-eliminated candidates shall be “C” and the number of candidates in “C” shall be “c.”
2. Use STV to elect c-1 number of candidates from C. The set of winners shall be “C2.”
3. Use STV to elect c-2 number of candidates from C2. The winners shall be “C3.”
4. Repeat the process, until the number of candidates elected is equal to that of the set number of winners.

Under this modification, Condorcet candidates have a stronger chance of being elected. It is, therefore, a change that will make STV even more representative of the electorate and a modification that should be adopted alongside STV. Using the same ballots from Examples 1 and 2, Example 4 shows that ESTV can successfully elect the Condorcet Candidate B, rather than Candidate D, who was elected under regular STV.

**Figure 3. Exhaustive Single Transferable Voting**
Example 4. Electing One Candidate with Exhaustive Single Transferable Voting

Premise: 24 voters elect one candidate from a selection of six candidates (Candidates A, B, C, D, E, and F). Their ranked ballots are shown in Figure 2.

First Elimination: From the six initial candidates, this round elects five and eliminates one using normal STV rules. The quota is set at four votes. Surpluses are transferred until only Candidate C has failed to reach quota. Candidate C is eliminated.

Second Elimination: From the remaining five candidates, this round elects four and eliminates one using normal STV rules. All votes are distributed to their ballots’ most-preferred remaining candidates. The quota is set at five votes. Surpluses are transferred until there are no longer any surpluses left to transfer. Even after all transfers have been made, only three candidates have reached the quota. Candidate F, who has the least amount of votes, is eliminated.

Third Elimination: From the remaining four candidates, this round elects three and eliminates one using normal STV rules. All votes are distributed to their ballots’ most-preferred remaining candidates. The quota is set at six votes. From this initial distribution of votes, Candidates A, B, and D reach quota. Therefore, no surpluses need to be transferred and Candidate E is eliminated.

Fourth Elimination: From the remaining three candidates, this round elects two and eliminates one using normal STV rules. All votes are distributed to their ballots’ most-preferred remaining candidates. The quota is set at eight votes. Surpluses are transferred until only Candidate D has failed to reach quota. Candidate D, who was elected under unmodified STV, is thereby eliminated.

Final Elimination and Election of the Winner: In this final round, each vote is distributed to either Candidate A or Candidate B, based upon who was placed higher on each ranked ballot. 13 voters prefer Candidate B, while 11 prefer Candidate A. Candidate A, therefore, becomes the final eliminated candidate, while Condorcet Candidate B is elected as the winner.
CONCLUSION

In the state and federal levels, our representative bodies are plagued by a number of problems. The United States House of Representatives is vexed by partisan deadlock, as both parties fight for slim majorities. In the Utah State House of Representatives, the Republican voters in the state are far over-represented on the Hill, creating an ideological and partisan gap between leaders and their constituents. On the district level, for both houses, Democrats and Republicans alike enjoy safe districts, gerrymandered in their favor to protect them from challengers and the judgment of their own voters. These safe districts distance representatives from those whom they are charged to represent and cushion the legislative bodies at-large from changes in electoral preferences. Representation, accountability, and contestability, the three foundations of democracy and competitive government, are all lacking, to the detriment of our great nation and state.

This is not to cast any blame on those who drafted our federal and state constitution, who left it to our discretion to create voting systems which we find fair and just. Nor is the Republican Party to blame, for even though they benefit from single-member districts in the Utah and Congress this session, Democrats benefit and have benefited from single-member districts in other states and other times. Instead of blaming those who use the system to their own advantage, by gerrymandering safe districts for themselves, we must see the system itself as the problem. An electoral system based upon single-member districts cannot guarantee a government which is representative of, accountable to, and contestable by its electorate.

I have made a case for addressing our political problems by reforming the electoral system. Through the adoption of both three-member districts and single transferable voting, many of the problems which plague our politics can be addressed. Gerrymandering, invulnerable incumbents, and results that do not reflect the electorate can all be addressed by such changes. Just as importantly, the ability of voters to control their government through relatively simple coalitions remains intact with districts which only have three seats.

Additionally, the article addresses a potential weakness of STV systems, shared by most systems, which arises when candidates greatly outnumber the available seats, thereby reducing the most-preferred ballots cast for the Condorcet candidates and allowing more polarizing and narrowly-appealing candidates to be elected. The weakness is corrected through a proposed reiterative calculation of ballots, such that decreasing numbers of winners are determined, with one candidate eliminated at a time, until only the desired number of candidates remains. This provision protects the system from being overwhelmed by an excess of candidates and Condorcet candidates suffering unwise and unjust disadvantage.

To implement these changes, Utah and the nation would continue their bold, yet recently stagnated, history of electoral system reform. Utahns deserve a fully representative and competitive House of Representatives. The example we set in our own state could lead to reform around the nation, on both the congressional and state levels, thereby strengthening our democracy and bringing more accountability to our government.

REFERENCES


Federalist Papers no 62, 1788.


Laasko, Markku and Rein Taagepera. (1979). "Effective Number of Parties: A Measure of with Application to West Europe."


