# *Considerations on a Representative Government*

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"There are no solutions; there are only trade-offs" -T Sowell

## 1 Introduction

The scope of this paper is to discuss the differing forms of representative government. It will be assumed that other forms of government without elected representatives are inferior or outside the context of discussion. The title not only defines the scope but is a clear reference to the famous work of the same title by John Stuart Mill. While over 150 years old much of the content is still relevant and influences the remarks written here.

As with writing a summary of any complex issue the compression of information inevitably leads to a loss of detail. As such, this paper is written with the intent to give the reader as deep an understanding of the issues as possible while not giving mathematical proofs for well-established theory. This is intended as an introduction to the issues not as a comprehensive summary. The interested reader is encouraged to use this as a starting point for study into the complexities of the issues raised. While the majority of this paper is a review of the possibilities, the end of the paper includes a proposal for an optimal system considering all relevant factors.

The context will be further constrained to Canadian considerations. While the discussed systems can clearly be implemented in any government it is important to note the context. Canada currently has the Westminster System and this will be the lens under which this document is written. As such, most new systems will be discussed as modifications to the Westminster system. In established systems, a large change is difficult so some consideration should be given to the proposed system's distance from the current system.

Electoral systems fall under a class of game theory called social choice theory. The task at hand is to decide the which "game" would result in a desirable outcome independent of who is playing. Even though they are often thought of this way in modern divisive politics, elections are not a zero-sum game since there can be compromise. Ones wants to design an electoral system which tends toward[1] the optimization of some quantity which has some general good for the population. Under the umbrella of representative government this quantity is representation of the population. Since "representation" can be defined in a number of ways and there are multiple equally representative systems, there are other outcomes to be considered.

The process of running elections and the political process is an inevitably competitive system. No amount of forethought on election systems can change this from a competitive game to a cooperative game. However, one can design system such that when used it naturally evolves

[1] Has a Nash Equilibrium where players are incentivized to promote the common good.

towards the outcome of a cooperative game. As stated by Nobel laurite F. Hayek “Planning and competition can be combined only by planning for competition, not by planning against competition.” In this case Hayek was speaking of economic systems but the statement holds in this case. Economists plan an economy such that competitive players will produce results as if they were being cooperative. An electoral system must be designed in a similar way.

## 2 Representative government

A Representative Government is a political system in which members of an elected assembly form a government. A Representative Government is formed out of a system of Representative Democracy when elected members are the electorate's representatives in government. This is a two-step process, first an election is called where the assembly is elected by citizens through a balloting system, then the government is formed from the elected assembly through its own process.

### 2.1 Westminster System

In the Canadian version of the Westminster System, the ballots are cast by a single vote where the candidate with the most votes represent the regional constituencies. The government is then formed by the member who has the confidence of the most other elected members. In practice, the process of obtaining “The Confidence of the House” has many traditions, paramount of which is that the leader of the largest party is entitled to the first attempt to form a government.

Much of the representation of the election of the assembly can be lost in the formation of the government if it only represents one political party or faction. For this reason, in the Westminster System the parties which are not involved in the formation of the government form the opposition. In a similar manner to the formation of government, the opposition is often formed from the largest party not in the government. The opposition is intended to be a safeguard on the actions of the government. Despite this, elected members in the opposition have significantly less influence than those who are in the government. Furthermore, members who are not in the government or the opposition have their influence further diminished. Consequently, some representation is invariably lost for some regions and consequently some citizens.

## 3 Proportionate Representation vs Proportional Representation

In a representative government, all democratic powers are delegated from the electorate to the elected representatives. This does not mean that there should be no communication between the elected representative and the electorate but quite the opposite. A representative should be well informed of the will of their constituents. In the event of a divisive issue, a binding vote by the electorate itself may be enacted to ensure the will of the people is known.

The motivation for the delegation of governing decisions to an elected representative is that expertise is scarce and the complexities of much of the role of governing is specialized. The

role of the elected representative is to represent the people in the “best” way possible. Since the citizens represented by each member are diverse in their desires, the definition of best is imprecise. Representatives first owe their decisions to the rule of law but then to a mixture of their expertise and the will of those they represent. They fill the role of the "representative experts" in Plato's *Ship of State*.

Each member of the elected assembly is expected to represent some group of citizens. In some systems this is done by proxy through a political party where the party represents its adherents through the power of the affiliated elected member. From the other perspective, under varying systems each citizen may have any number of representatives. In practice, some systems can have many citizens who do not have a representative who is explicitly expected to represent them.

One of the first issues to be decided upon when designing a representative government is how to divide the electorate among the representatives and vice versa. Two logical requirements for this are that all citizens have a representative and all representatives have a similar number of citizens. The allocation of this is the primary issue of a representative democracy. For example, if the assembly contains 100 seats to fill, how is it decided for each seat which group of citizens is associated to it for elections so that they can fill the seat with their representative. 100 random groups of the population is clearly not useful as the groups would be less prone to have a unique message for representation than other groupings. Since this is in principle a delegative process the primary split line between group should be based on some feature of the citizens being grouped.

There are two well defined splits possible, Proportionate (regional) Representation and Proportional (partisan) Representation[2]. In Proportionate Representation, the division is done by regional boundaries to form constituencies. The elected member is to represent all people in a regional riding, not just those who voted for them. This means that every citizen is represented by one member. This is the case even for those who do not vote for that member or did not vote at all. In Proportional Representation, the division is along partisan lines. Each member is to represent the people who share the values of the party the representative is a member of. The delegation process is less clear as not all citizens have a political stance represented by an elected party so not all citizens have a representative. This tends to affect minority groups more often and as such can lead to a lack of representation for them. Citizens who are adherents of a political party then have many associated representatives organized by the party.

In both regional and partisan systems, it is possible that there are citizens with concerns which are not represented appropriately. Therefore, neither of these systems are what is desired from a theoretical standpoint. For true representation, one would want a system which represents all ideological, special interest and other groups as well as all the mainstream views required for running the government. Due to the number of possible views in the intersection of the number of possible issues it is clearly impossible to represent each citizen’s nuanced political belief structure in a balanced manner. This is due to the associated problem of how each issue should be weighted against each other. What value is desired to optimize on? Most freedom? Least

[2] Due to the similarity of the words Proportionate and Proportional the terms Regional and Partisan will be used in many places.

suffering? Most opportunities? Least coercion? Equality of treatment? Equality of outcome? In a broad sense, a system can only optimize for one value so to attempt a system which represents issues in a combined way is impossible. This is the core motivation for representation of the people not the people's issues directly. It is understood that this abstraction loses some theoretical utility but it must be done since the utility is unquantifiable. This unquantifiability is the same issue as the imprecise definition of "best" way for the member to represent their citizens. This is the burden of the representative.

A common attempt at solving this problem is to try to represent along ethnic, sexual, racial or other characteristics of the citizens. This representation is (hopefully) purely a poor proxy for the special interest groups which correlate with such groups. It quite clearly fails to do this and dividing along such lines otherwise is not something worth discussing at length here.

Having no other reasonable options to group citizens by, there remains two possible divisional lines to draw the balloting system along, to elect representatives; Proportionate (regional) and Proportional (partisan). The merits of each will be discussed below.

### 3.1 Proportional Representation

From a historical perspective parties have been viewed as a necessary evil of the political process. George Washington spoke out against political parties in general in his 1796 Farewell Address, claiming their existence "agitates the community with ill-founded jealousies and false alarms, kindles the animosity of one part against another."

The Westminster System is not explicitly a partisan system in the sense that parties are not part of the process by prescription. Even so, in Canada they do exist and have a great deal of power in how the country is governed. Proportional Representation is a move to representation of the electorate by parties through elected officials. This can be good or bad based on one's opinion which is largely dictated by how strong one's allegiance is to a party. Proportional Representation assumes that politics is a zero-sum game[3]. Building this into the system defeats the chance for compromise which could yield higher total rewards for the population.

To add total Proportional Representation to the Westminster System is a change from representation of all people by elected members to representation of some people by political parties through elected members. This may seem to be a total loss but there is one gain. The loss of representation and fairness to the people is traded for a gain in fairness for the parties. Imagine a scenario where there are two parties, party A gets 51% of the popular vote and 49% of the seats while party B gets the opposite. It could be argued that this is unfair to Party A because they are not the ones to form the government even though they have the popular vote. This is more of an issue with how governments are formed than anything else but in the current system it is a clear problem. Another scenario is that a party which gets 5% of the national popular vote could receive 0% of the seats. This party could also claim that this is unfair since the party does not get the representation it "deserves" in the assembly. A representative government is intended to represent the citizens not the party. However, those who are strongly aligned with a party will

[3] Zero-sum is a situation in which one person's gain is equivalent to another's loss, so the net change in benefit is zero

share in the parties' feeling of unfairness. Adoption of Proportional (Partisan) Representation would be an act by those who support a specific party to disempower those who do not support any.

Non-dominant parties with broad national interest would gain seats from a change to partisan representation from regional representation. This means that small parties tend to favour such a system. A case can be made that small partisan groups are closer to the special interest groups which one would ideally like to represent. In theory, this can be true but in practice there are a number of barriers which prevent this from working. The first and most obvious is that a group which is large enough to define a political party is generally large enough to have a representative voice on key issues in other parties.

To argue that a small party represents a specific unrepresented issue is not seen often in practice. An issue which is too obscure to get attention or a group which does not have enough members to have a national voice would likely not have its due representation. For example, if a particular issue with technological security were to come up and only a few experts were aware of the general threat and how legislation could be formed to guard against it; how then, is a party intended to form to address this issue?[4] This can be done through lobbies, but that necessitates monetary backing. Some issues can get media attention if they appeal to the emotions or fears of the public. Another example would be groups that desire representation due to their unique interests. This could be due to regional, occupational or really anything that could be used to define a group. As stated above this is not an issue if the group is large enough to influence a major party. From this it can be seen that Proportional Representation has a tendency to exacerbate the problem of unrepresented issues by giving the power to large parties. Ironically proponents often claim the opposite. A further issue is that the whole of the ideological center who hold nuanced ideals and partially support many parties on specific issues are not expected to be represented by anybody.

In the presence of large parties, it is worth considering what a small party would represent. In some cases, it would be the desired special interest issues and groups but not in all. If it is not a single issue then it must be fringe in terms of general ideology. This is typically, the far left and far right. It is unclear if political radicals would be productive members of the assembly if their views are by definition inconsistent with the majority. Some implementations of Proportional Representation require a party to win several seats in order to be able to claim any. This is generally argued on the grounds of preventing ethno-nationalist parties from having a voice but it clearly would eliminate any possible gain from Proportional Representation. In summary, there is no net gain for the individual citizen from Proportional Representation but a good degree of power would be gained by political parties.

### 3.2 Proportionate

The Westminster system is fully regional and as such has 100% Proportionate Representation. In Canada, Proportionate Representation is defined and ensured in each of the

[4] This is the case with the Pirate Party in Canada who has legitimate technological concerns but has never come close to winning a seat.

constitutions. Specifically, it is ensured that the Provinces have Proportionate Representation in Section 52 and 42 of the constitution act of 1867 and 1982, respectively. This means that regional representation is required at least on the provincial level in Canada.

From a historical perspective, regional representation is the default. The difference is that historically the "voting" would be done with force and the lord who could rally the most force from their populace would have the most power. One can even see such dominance hierarchies forming ineluctably in primates. Human evolution under regional hierarchies has caused us to care more about people who are in close proximity. Regional representation seems an intuitive underpinning for a system and mirrors how nations formed historically. Joe Clark often described Canada as a "community of communities."

Representative democracies which are stable have been analyzed by Adolf Gasser and compared to the unstable representative democracies in his book *Gemeindefreiheit als Rettung Europas* which was published in 1943. In it he argues that for stability the societal power must be built from the bottom up based on local communities. Many studies have shown that grand narratives tend to fail where complex emergent systems do not. The local and the individual is where an emergent system would be derived from.

One of the special interest groups which is guaranteed to have common interests is that defined by region. This could be because of the unique conditions of that area, the environment or any of many regional issues. In contrast to partisan voting, all citizens have a region but not all have a party. From an economics perspective, all implementations are by nature local. The effects of policies and legislature are on individuals or specific objects. Tip O'Neill is often quoted for the expression he coined "all politics is local". His motivation for this statement was that politicians must appeal to the simple, mundane and everyday concerns of those who elect them into office. Those personal issues, rather than big and intangible ideas, are often what voters care most about, according to this principle. This is not explicitly true because there are many high-profile ideas that can get people very motivated to vote. However, the non-local issues tend to be more divisive because they are based on grand narratives. The O'Neal quote is really more of a wish than an actuality. If one is to design such a system then one can fulfill this wish.

### 3.3 Mixed Systems

The regional and partisan representational systems have a natural trade-off between each other. The more candidates that represent an area the more chance there is for a small party to get a seat. A 100% partisan system has no individual regional representation. A 100% regional system will have some degree of partisan representation. The degree is highly dependent on the actual system and balloting method. The degree of Proportional Representation is defined by the ratio of the percent of seats obtained divided by of the percent of the popular vote for each party. Perfect proportional representation is 1 for each party. This quantity cannot be zero for all parties and can never be infinite.

There are two basic ways to mix regional and partisan systems. The first is to have some seats allocated to regional representatives and the rest to partisan representatives. The ratio of the

split is dependent on choice. The other option is to have fewer ridings which more than one member can represent. The simplest such systems have the same number of representatives in each larger riding. While this is not a directly proportional system in the sense that votes are not cast directly for parties, the elections tend to have results where the number of votes cast for each party more closely represents the proportion of seats obtained. There are more complex versions of multi-member constituency systems. One popular system is where the top candidates are taken for each riding until at least some percentage (eg 50%) of the riding is represented. A perceived downside to this system is that the number of seats available for members is unknown until after the election. Furthermore, it is unclear how much power each member should have and who exactly does each member represent. Another possibility is to attempt to mitigate split ridings by electing the top two candidates from a single constituency if the races are sufficiently close. This has the advantage of taking power and interest away from these so-called battle ground ridings and making campaigning more even across the area. It also reduces the effect of gerrymandering.

Larger regions have some advantages and disadvantages. Some voters lose clear representation but split ridings can have a representative for each large group. If a region is densely populated enough it can have no clear boundary to separate people. This would be a good place for multi-member ridings

### 3.4 Special Interest Representatives

A mixed system represents broad ideological issues by being more proportional, as well as representing regional issues by staying somewhat proportionate. However, there may still be special interest issues and groups that do not have representation. There are two ways to compensate for this. One would be strictly nonpartisan nonregional representatives. This would require a modification to the balloting system to be described later. The other would be something like petitioning done directly by the people. One form is protests but this would not be desired as a fundamental part of the system as it can lead to civil unrest. Another would be lobbying but this has a monetary barrier. The more civil and free form would be a form of petition where there is a guarantee that the issue actually gets the representation deserved.

The problem is how to represent an issue when it only affects a small number of people but is crucial to them, or it is an obscure issue that has a large national effect. In any case an expert on the issue would need to be brought forward to represent the issue. As discussed before, this somewhat goes outside the scope of a representative democracy since this is representation of ideas not people. However, the choice of using individuals as the core unit of representation was known to only be a proxy for representing their desires.

In principle, the elected representatives can form a special research committee to investigate the problem. This often happens and is how this essay was requested to be written. This does not necessarily solve the issue since even when made aware of the issue there is no guarantee to take action. The most practicable solution is still to set aside a few (about 1%) of the seats for a national vote to assign the issue experts to the seats. This process however does not eliminate the possibility of the tyranny of the majority. If seats were put aside for specific underrepresented issues or groups it needs to be ensured that the seats don’t go to issues that are already in the platform of a major party. This would be the same as a mixed system with some

national partisan seats. To avoid this, constraints are needed on how to select representative to fill such a seat. Furthermore, there needs to be a part of the balloting system to decide which issues are of greatest importance. As discussed before there is not a universal way to compare the relative importance people place on issues.

Because of the issues associated with how to fill special interest seats, they are virtually never used in modern systems. In many cases it is argued that partisan seats are close enough and these seats would add a level of instability to the system if they are nonpartisan. If all members were special interest members then the assembly would be entirely comprised of advocates for change. Such a radically progressive system would tend to stagnation or instability.

## 4 Balloting Methods

Balloting methods are the most debated part of electoral reform. There are two main reasons for this. The first is that nobody agrees on which features should be present and which criteria should be met. No system can have them all and many criteria play off against each other. Some criteria are viewed as a positive by some but irrelevant or negative by others. The second issue is that some of the most compelling criteria requirements are mathematically complex to understand.

One example of a criteria whose merits are debated is the *Condorcet Winner Criterion*. It requires that if there is a candidate X who could obtain a majority of votes in all pairwise contests against every other alternative candidate, the voting rule should choose X as the winner.

A similar but more widely accepted requirement is *Unanimity* (Pareto Criterion). If every voter prefers alternative X over alternative Y, then the system prefers X over Y.

One of the most agreed upon criteria is the *Monotonicity Criterion.* It is defined as; if X is a winner under a voting rule, and one or more voters change their preferences in a way favourable to X (without changing the way in which they prefer any other alternatives), then X should still be a winner. In short, expressing a stronger preference for a candidate should not cause them to lose.

A less strict version of *Monotonicity* is the *Independence of Irrelevant Alternatives*. It is that having an extra person on the ballot should not matter to the comparison of any other two. If every voter's preference between X and Y remains unchanged, then the group's preference between X and Y will also remain unchanged (even if voters' preferences between other pairs like X and Z, Y and Z, or Z and W change). Presence of this issue almost always causes strategic voting to become common.

Strategic voting is something one would like to avoid because being able to predict how others will act improves the odds of a globally favorable outcome[5]. However, nearly all realistic voting systems fall under the *Gibbard–Satterthwaite theorem*. It states that it is impossible to have a voting system without strategic voting. “Voting system” means a deterministic, non-dictatorial system where a finite number of voters submit ballots of a finite number of types, and

[5] A strategy is a Nash equilibrium if no player can do better by unilaterally changing his or her strategy.

the result is one of a finite number of options. "Strategic voting" means that your optimal ballot depends on how others vote, not just on your own preferences. This means any such method must be subject to strategic voting in some instances but the amount of gain from strategic voting is very dependent on the balloting method. It will be shown later how some systems use this to promote division and some to promote compromise.

### 4.1 Plurality Voting

This form of ballot gives each voter the ability to choose one of many candidates as their preferred representative and the winning candidate is the one with a plurality (the most votes). It is by far the most common form of voting and is virtually always what is used in simple situations. The major advantage of this system is the simplicity and therefore the accessibility to the public for understanding. Historically, this simplicity was needed for the trust of the electorate but in modern times the education level is so much higher that a much more complicated system could have a broad level of understanding by the public.

The biggest issue with a single vote is that it can cause *vote splitting*. *Vote splitting* is when two candidates are similar so they each get half the votes they would if the other were not running. This is a good example of failing *the Independence of Irrelevant Alternatives Criterion*.

Another issue is that the voter's preferred candidate may be highly unpopular in the riding. This means that using their only vote on that candidate has no influence on the result and could be better served on a second or third choice. This is often referred to as the *wasted vote* problem if they still vote for them or the *favorite betrayal* problem if they vote for another candidate. This system rewards voters for not voting for whom they really want and as such promotes strategic voting. With all systems of voting the second order effect from people trying to vote strategically must be considered. Strategic voting can undermine a system which would theoretically work well if everybody was honest. The *Gibbard–Satterthwaite theorem* illustrates how difficult this can be.

This system only works well and does not suffer the flaws above when there are only two candidates. The second order effect of this is that representatives, and subsequently parties, tend to polarize as a result of attempts to gain votes. For this reason, it is often called a two-party voting system. Two-party systems have a tendency towards divisiveness among the populous or as founding father of the United States John Adams phrased it:

*There is nothing which I dread so much as a division of the republic into two great parties, each arranged under its leader, and concerting measures in opposition to each other. This, in my humble apprehension, is to be dreaded as the greatest political evil under our Constitution.*

John Adam's dread is now the reality which is the core of the issue with the U.S.

### 4.2 Ordinal/Rank Voting

Ordinal voting is the class of ballot systems where the candidates are ranked in order of preference. Some systems allow for the possibility of ranking two candidates the same. A ranking is defined mathematically if all rankings are possible (complete) and; if a voter prefers A over B and prefers B over C, then that voter must prefer A over C (Transitive).

The major advantage of such a system is to eliminate vote splitting and eliminate issues which give rise to the *wasted vote* or the *favorite betrayal* problem. Another advantage is that voters perceive that they are going to get a fairer result by giving a ranking than by other balloting methods. Unfortunately, it can be proven mathematically that ranking results in issues when trying to select a communal preference. There are no non-dictatorial rank voting systems with both *Unanimity* and *Independence of Irrelevant Alternatives* which can produce such a communal preference. This is known as *Arrow's impossibility theorem* and states that when voters have three or more candidates no ranked voting electoral system can convert the ranked preferences of individuals into a community-wide (complete and transitive) ranking while also meeting *Unanimity* and *Independence of Irrelevant Alternatives*. It cannot be overstated how important this result is for showing that ordinal methods are unfit for a voting system. Both *Unanimity* and *Independence of Irrelevant Alternatives* are well supported requirements by experts and the general public. The main reason that ranked systems are still proposed is that the general public is not aware of the *Arrow's impossibility theorem* because it is mathematically complex and somewhat counter intuitive in many systems.

There have been two proposed solutions to this issue. The first is a series of plurality votes where the candidate with the fewest number of votes is removed each time. This simulates ranked voting so escapes *Arrow's impossibility theorem* but it is generally thought of as prohibitively expensive and logistically demanding. Other systems have been proposed where the losing candidate delegates their votes to their preferred candidate. This is in line with the representative and delegate underpinnings desired in such a system but takes away a large amount of choice compared to a typical ordinal system.

### 4.2.1 Vote Aggregation

There are several ways to aggregate the ranks but all suffer from *Arrow's impossibility theorem*. The simplest is Two Round Runoff where the two with the most top ranks are chosen and the final decision is made by incorporating the preference among the others for those two. Doing this with two plurality votes would produce the same result if the voters are honest and are not given new information between the rounds.

A more complex system for aggregation is Instant run off. In this system, the lowest ranking candidate is removed and their votes are move to the voters next choice. This process is repeated until a winner is found.

This can also be used for multi-member constituencies. For example, if one wants to elect two candidates and four are running. If one candidate gets 50% of the first choices then they are elected. For the three remaining, the winner is decided by removing the lowest ranked candidates and reallocating the votes for them as before. Complexities arise when the first elected candidate has more than the 50% needed to secure a seat. These surplus votes can be reallocated or not

depending on the system. One could argue that all the people got their representative so they should be happy and do not need their vote reallocated. If they are to be reallocated, the number of surplus votes is known but none of the various allocation methods is universally preferred. One such example is to use a random subset of all the votes but randomization is logistically difficult with physical ballots. More practically it can be done as votes are counted initially. Once a candidate receives enough votes they are taken out of the race and new ballots coming in are allocated to the next candidate. It is important to note that both methods are nondeterministic meaning that a recount could result in a different outcome. This directly prohibits using such methods when combining instant run off with multi-member ridings. There are other methods for handing the surplus allocation but there is much debate if any are without fatal flaw.

Interestingly Instant Runoff fails another possibly desirable criterion know as the *Participation Criterion*. Voting systems that fail the *Participation Criterion* are said to exhibit the no show paradox and allow a particularly unusual strategy of tactical voting: abstaining from an election can help a voter's preferred choice win.

The class of Ordinal Voting tends to fail more desired criteria and be more complex to count and understand than the other broad class know as Cardinal Voting

### 4.3 Cardinal/Range Voting

Cardinal voting is when each voter can assign a number score to each candidate. Strictly speaking, cardinal voting can pass more information than the ordinal (rank) voting. This can clearly be seen by the fact that a rank can be derived from a set of numbers provided there are more possible numbers than candidates. Unlike ordinal voting, *Arrow's Impossibility Theorem* does not apply to cardinal methods. Furthermore, all cardinal methods satisfy the *participation criterion*.

In Cardinal voting, if any set of voters increase a candidate's score, it obviously can help him, but cannot hurt him. That is a restatement *monotonicity* and is a stricter requirement than *Independence of Irrelevant Alternatives* so it is satisfied as well. As such, a voter's score for candidate C in no way affects the battle between A vs. B. Hence, a voter can give their honest opinion of C without fear of a *wasted vote* or hurting A. There is never incentive to *favorite betrayal* by giving a higher score to a candidate who is liked less.

Most cardinal methods do fall under the *Gibbard–Satterthwaite theorem*, and therefore any such method must be subject to strategic voting in some instances. There is no relevant system where strategic voting cannot be used to try to game the system but cardinal methods minimize the advantage of voting strategically.

While in all systems all votes are actually counted there is a psychological effect to the feeling that the vote "does not count" in a *wasted vote* situation. Cardinal voting maximized the number of people who voted for a candidate to become the representative. This is expected to have a knock-on effect of better acceptance of results and higher voter turnout.

### 4.3.1 Vote Aggregation and Tallying Methods

Cardinal voting is called Range Voting when a sum or average is used to tally votes. It is typical to use a sum. Averages will give a differing result in systems where there is a no opinion option for each candidate meaning that the average is done over a differing number of voters for each candidate.

Range voting has the lowest *Bayesian Regret* among all common single-winner election methods. Bayesian regret is a measure of how the second order consequences of using a system affects the population. It can be thought of as the quantifiable amount of "expected avoidable human unhappiness".

The median can also be used in the Majority judgment system. The use of the median is intended to further diminish the effects of strategic voting. Majority judgment voting satisfies the *majority criterion*, stated as "if one candidate is preferred by a majority (more than 50%) of voters, then that candidate must win". It should be noted that instant runoff ordinal voting also satisfies this criterion. While it might sound like this is always a good requirement of a voting system consider a polarized scenario where 51% prefers one candidate and hates the other while the remaining 49% are just the opposite. If there was a third candidate who 100% would be satisfied with they would not be elected in a system which satisfied the majority criterion. Satisfying the majority criterion reduces incentive for compromise and raises *Bayesian Regret.*

Stochastic voting is an aggregation method which is intended to be more proportional and passes virtually all the voting criterion mentioned above because it is technically dictatorial. It even escapes the strategic voting most systems were shown to have by the *Gibbard–Satterthwaite theorem*. The process involves combining votes/cardinal values to give each candidate a share of the total support. For a single member plurality system, this could be the percent of votes. The share is then used a prior probability (ie the odds) and a winner is chosen at random relative to that probability. This then gives all candidates who received a vote a chance and the odds of winning is directly determined by the share of support. The randomness of the system as well as possibilities for vote fraud make many people uneasy. There is also no possibility of a recount.

### 4.3.2 Gradation and Range

The range does not matter for aggregation by sum, average or median. This can be demonstrated by showing that there is always a mapping to the desired range which preserves the results. Simply put, voting in the range [0,1] or [0,100] or even [-42,7] is irrelevant.

However, the gradation or the number of choices within the range does matter. This is where Cardinal voting gets its name, the cardinality of a set is a measure of the number of elements of the set. To be better than ordinal voting in the sense of offering choice the number of gradations must be greater than the number of candidates. This is clear since this is the only way a clear ordering can be given. Further gradation would result in better discernment of the amount to which each candidate is preferred. However, it becomes increasingly difficult to determine by

the voter how different ratings would translate into winning candidates. It was discussed above how some systems promote strategic voting that leads to polarization. Cardinal voting is unbiased relative to polarization if the gradation is sufficiently large.

The other extreme case of this is Approval Voting for which the voter is given only a binary (yes/no) choice. This is then the same as the typical plurality voting system except more than one choice can be made. Plurality and Ordinal voting both have natural pro-extremist polarization bias, conversely approval has pro-centrist bias. Political polarization is generally viewed as divisive and undesirable so forcing the electorate towards a moderate candidate should be in general good. This was already illustrated in the example of why the *majority criterion* is not necessarily desirable. It is worth noting that this does not lead to a tyranny of the majority situation as that is different from a tendency towards a moderate or compromise candidate. For example, if there is a small group in desire of representation the candidates would gain approval if they could add the desires of this group to their platform. This means issues that are neutral to the majority and highly relevant to a small group are important for candidates to understand. Additionally, if the overlap of votes is released then the candidates can study the results to determine which candidates represented an isolated group. For example, if there was a candidate who received a significant number of votes because of a particular issue but did not do well in general, then in the case that the runner up candidate's opinions are consistent with the issue they should include it for the next election to be more competitive.

# 5 Other considerations

The two components of an electoral system discussed so far are the choice of Proportional Representation vs Proportionate Representation and the balloting method. These can mostly be chosen independently, however there are cases like with multi-member districts using instant runoff where the number of problems are much greater. External to these choices there are a number of other considerations which are relevant to electoral reform.

## 5.1 Party affiliation

It is virtually impossible to be elected without the endorsement of a party. This reverses the direction of the propagation of power from bottom up to top down. There is no reason a candidate could not endorse multiple or no parties in an election system. Conversely, in principle a party could endorse multiple candidates in a particular riding. The current polarizing system gives game theoretic reasons for parties not to do this, namely vote splitting. Under other systems this is no longer an issue.

Having strong party affiliations undermines the concept of a representative democracy in the sense that the ill informed will use the candidate as a proxy for the party or worse yet the leader of the party. It is further undermined by the process known as "whipping" where a representative is encouraged to vote against the wishes of themselves and their constituents to be endorsed in the next election by their party.

## 5.2 Selection of Candidates

An important matter to be considered is which candidates should be on the ballot in the first place. Too many candidates on the ballot could make voting a burden. The limitation is normally done by parties as discussed above. If the system is changed so that parties do not suffer if they choose to endorse multiple candidates then more will run. Furthermore, if it is much more likely for an independent to win, even more will run.

It would seem logical to have some restrictions on who could be candidates in order to make voting simple. For example, if the system has local representatives then they could be required to be local to the riding. Currently in Canada, candidates running in a riding may be put there by a party without ever having lived in the riding or in some cases currently not even living in the country. This shows the power of the party in the system.

To further limit the number of people a restriction of nomination could be put in place. For example, requiring 100 signatures of the fellow constituents in a riding. Monetary restrictions would favor the affluent and corrupt so they would not be desirable.

### 5.3 None of the above

The popularity of a candidate is often judged relative to the other candidates they ran against. Many people do not vote because they do not endorse any candidate. A more informative system would have the option to vote for no candidate. This would give the winner a real idea how much of the constituents they represent. This would also given the generally dissatisfied with the system a voice.

### 5.4 Mandated Party Platforms

It is often said that a party who forms the government has a mandate to fulfill their election promises. This is related to the partisan issues vs local issues problem of section 3. However, in practice it is more of a bait and switch way to state that the winning party won because all the election promises were supported. In fact, the winning party would be lucky to be able to claim that that more of the election promises were supported than any other party. It is totally unknown what level of support there is for each issue on the governing party's platform. Even so, this is often used to create a narrative that there is a broad mandate for the set of election promises.

This whole issue can be mitigated with a system which emphasizes representative governing instead of through the proxy of a party. The key issue people have with proportional (partisan) representation is that it exacerbates this sort of problem by giving more power to the political parties.

## 6 Formation of Government

The concept of winning party was introduced in the previous section. There is no winning party in a representative government but merely a party who forms the government. For the unity of the government, the formation is done by the selected leader as they see fit. The leader of the party who has the most seats typically tries to form a government. There is no reason that this

honour need be the leader of the largest party or any party. Coalition governments are often formed by two parties combining to govern together and blocking the confidence in the leader of the largest party. Under the consideration of coalitions and the evolution of parties, it is highly unlikely that each party has a platform which represents a unified cluster of popular opinion[6]. As such, it would be unexpected for the leader of any party to be the member with the highest confidence of the house.

Because of which, this process does not adhere particularly well to the concept of a representative government. Instead, it would be desirable to choose a leader of the government through election by the members in a similar manner as the members were chosen in the first place. In principle, this could be a member which leads no party but has broad general support of the other members. The role of the official opposition in the Westminster System is an important check on governmental power. The leader of the opposition must also be selected to form this opposition. It would be desirable if the government and the opposition were optimally polarized to each other so that opposition could be ensured.

There is much desire to find a leader who would have high confidence of the house but this is difficult to achieve. A system like that used by the papal conclave would achieve this but it would likely stagnate. Forming coalitions which comprise a majority has been known to take a very long as well. There is likely no way to force a majority of member to agree on a leader so minority governments are unavoidable.

### 6.1 Representation When Voting on Bills

It is common that changes to legislature are not decided by the government alone. The government is normally not formed from all parties so some decisions are made based on a vote from the whole of the elected representatives. There are many ways in which this can happen and they tend to depend on the system under which the representative was elected.

By far the most common method is that each representative gets one vote to approve or disapprove of a bill. In a regional system where each region has the same number of constituent this makes sense. Even in that case, some have argued that while the representative is expected to vote on behalf of all constituents they can't do this on divisive issues because not all the constituents agree. Therefore, it is open for debate if a representative should have the voting power of those who did not vote for them and do not want to be represented by them.

In some systems, it would be possible to vote based on number of votes cast for them. Alternatively, voting power could be based on the percent of votes cast for them. These two differ in that the former is affected by voter turn out.

There is some ambiguity as to which issues should be decided by a referendum and which should be decided by the representatives alone. In a system where the representative's vote only has the weight of the people who had voted for them, the democratic power of those who did not can still be used by those individuals. This would help for the representation of citizens who are well informed on particular issues. The representative is expected to be well

[6] Mathematically principle component in the opinion space of the populace.

informed on all issues but the typical citizen does not have such time or interest. The complexities of tracking who voted for whom and keeping it secret while allowing the individuals to vote on specific issues on their own is likely too logistically complex to work in practice. For completeness, it should also be mentioned that even more complex system are possible where the people who did vote for the winning candidate could vote themselves.

# 7 Popular Election Systems

To this point, many of the considerations when building a system of representative government have been addressed. These considerations are mostly modular. The choice of regional vs partisan is independent of the choice of balloting system which is are both independent of the choice of government formation. This means that the number of possible combinations is large and even larger when many systems have free parameters to be chosen within them. That said, there are several systems which have gained favor over the others.

## 7.1 Single Member Plurality (SMP)

This is the standard voting process in the Westminster System where each single member constituency has a plurality vote. It is a 100% proportionate system in which the candidate who gets the most votes in an electoral constituency wins. This suffers from all the shortcoming of the plurality vote discussed above. To review these major shortcomings are *vote splitting*, *wasted votes* and *favorite betrayal*. This is also a polarizing system, although, the polarization is often viewed as a positive because it leads to a strong ruling party and a strong opposition.

## 7.2 Party List System (List PR)

This is the system of pure proportional representation where votes are cast solely for a party using a single vote. Each party prepares a list of candidates prior to the election. Lists may be “closed” or “open.” For closed lists, voters endorse a party and its candidates as listed in the order put forward by that party. For open lists, voters may choose the candidates they prefer from amongst the candidates put forward by a party. The number of seats each party receives is derived from the share of popular vote and the candidates are chosen in order.

It was discussed already how partisan voting systems can leave citizens unrepresented. Since a plurality vote is used by people who vote for a party which does not obtain a seat, they have no local or partisan representation. The number of people this affects is bounded by the number of members being elected so it is always a small proportion of the population. This means that the actual balloting method does not have a large effect. This vastly simplifies the process and ends the complex debate about balloting methods

The larger issue is with Proportional Representation in general and whether a move to a partisan system is a net benefit. Many people can choose a favourite party and polarizing systems like SMP evolve to this. It is deeply flawed to assume that this is desirable just because the landscape created by the current system is that of polarized partisan politics.

Identification with a political party is deeply divisive since in-group self-identification with any group has been shown in many sociological studies to essentially block compromise. Furthermore, most people who do not vote feel disenfranchised because there is no party they feel represented by. Partisan politics is one of the major problems facing the political world today and it seems the motivation for strictly partisan systems is motivated by this divide more than an effort to enhance democracy. Embracing and emphasizing partisanship in an electoral system would have large unintended consequences with regards to partisanship and cronyism.

The advantage of being fairer to parties (and vicariously their adherents) at the cost of representation of the people is dubious at best. Those that lose representation are by definition going to be minority/special interest people since they will not be a party adherent.

The effect of partisanship should not be taken lightly. From a historical perspective, anti-partisan sentiment was not just the sentiment in the United states with John Adams and George Washington. Scottish philosopher David Hume, learning that his old friend, Benjamin Franklin, was deep in American political intrigues, recoiled in horror; "I am surprised to learn our friend, Dr. Franklin, is a man of faction. Faction, above all, is a dangerous thing.'' It is interesting to note that he used the word "faction" since the word "party" would have been going too far.

Political parties are not core to the political process and the power they have today was never intended in any system. For this reason, strictly partisan Proportional Representation should not be a goal. Systems below which are not partisan by design but will approximately have similar proportions of votes cast to seats won for parties should suffice to appease the parties.

A two-party system tends to find a balance in which they are very close in terms of popular vote. When in this situation Proportional Representation may seem to be necessary but other changes could eliminate the polarization which is the core of the issue.

It was noted above that these systems violate the constitution of Canada. Elections must be proportionate at least on the scale of the province.

### 7.3 Mixed Member Proportional (MMP)

Mixed Member Proportional is a mixed voting system of the type where there are both regional and partisan members elected. The voting system uses a single vote for both the region and the party, giving voters a separate vote under each. It can be thought of as a chimera of SMP and Party List.

The overall share of seats each party holds in the Legislative Assembly is determined by the party's share of the List PR vote. The List PR seats are allocated from the party's lists of candidates specifically to compensate for any disproportional results from the SMP vote, so that the overall result is proportional.

A similar alternative is Mixed Member Majoritarian where the party votes are not used to balance all seats but are balanced among the List PR seats.

Since this is a combination of both the systems above so it inherits all the issues of both systems. While some issues cancel each other, some do not. To fix the system the ballot must be changed otherwise issues like *vote splitting* remain.

### 7.4 Hare System

The Hare system published in *Treatise on the Election of Representatives* is one of the oldest (1859) and initially well accepted systems to replace SMP. It is a combination of single regional ridings with instant run-off ballots. The twist of the Hare system is to let people vote in ridings other than their own. Or as stated by John Stuart Mill in *Considerations of Representative Government* where he expressed great favor for the Hare system

*The votes would, as at present, be given locally; but any elector would be at liberty to vote for any candidate, in whatever part of the country he might offer himself. Those electors, therefore, who did not wish to be represented by any of the local candidates, might aid by their vote in the return of the person they liked best among all those throughout the country who had expressed a willingness to be chosen. This would so far give reality to the electoral rights of the otherwise virtually disfranchised minority.*

This brilliant solution to representation is also its downfall. The constant changing of regional boundaries to ensure that the same number of people are represented in each constituency is just one example. Another is that game theoretic reasons lead a voter to have to rank each candidate in the country. These logistical complications make the system prohibitively impractical even before considering the issues with instant run-off given above.

### 7.5 Single Transferable Vote (STV)

Single transferable vote can be thought of as an evolution of the Hare system. It is a mixed system of the multi-member riding type with an ordinal instant run-off ballot.

It is often said that this is a system of Proportional Representation but this is not technically true. It is a system which is designed to be approximately proportional in outcome but it has no explicitly partisan votes so it will not be in all cases. The proportionality of the system depends on how many members are elected in each electoral district.

In section 4.2.1 it was discussed that instant run-off voting should not be used with multi-member constituencies because of the issues which come up with how to handle the surplus votes. STV has many shortcomings both from a political and from a mathematical standpoint. Many of these shortcomings were already discussed but due to the popularity of the system and its amassment of issues it is worth discussing in depth.

1. STV elects many MLAs from one district which reduces the local accountability. The constituents would not have a single person to hold accountable. This destroys the most basic advantage of the Westminster system and regional representation.

2. STV allows for a no-show Paradox in which the act of numbering a candidate last could make them a winner. This implies that a voter should never rank all the candidates which destroys the foundations of the system and encourages strategic voting.
3. STV fails the *Monotonicity Criterion*, which means voters can penalize a candidate by ranking them first instead of second. Failing monotonicity should be a direct veto for any system since the act of giving more support to a person can cost them the election. That is not a feature of an open and democratic system so STV should never be used for important elections.
4. Several the above feature makes STV non-transparent. Even worse detecting that an issue has occurred is not always possible[7]. This means a voter is unlikely to know when they have been cheated. As a result, myths can arise or nefarious actors could trick voters under the guise of strategically voting in their favor.
5. STV allows fails *Condorcet Winner Criterion* and does not tend to be close in general like other methods
6. STV derives its Proportional Representation through the existence of multi-member districts. That is, a candidate or party can win in a large district but would have lost in a plurality of districts equal to the large district.

This system has the most issues of nearly all possible systems. Number 3 is a consequence of *Arrow's impossibility theorem* which was discussed before. STV has *unanimity* almost explicitly so it must fail *Independence of Irrelevant Alternatives* but it does so in the strongest possible way by failing the *Monotonicity Criterion*. That voting somebody higher could cause them to lose seems very hard to believe and the reader is encouraged to look up an example. For this and the high susceptibility to strategic voting this system is untenable and should not be use for any formal or serious election.

## 8 Proposed System

The astute reader will have noticed that none of the popular systems described above used Cardinal Voting nor did they alter the method of government formation. Ordinal voting is untenable for mathematical reasons leaving Cardinal voting as the alternative. Range voting, cardinal voting aggregated by a sum, should be a clear choice of balloting method. A sum would preserve the concept of a vote so the spirit of a traditional vote is not lost in the transition from SMP.

Mathematics aside, what a voter should be really concerned with is who they would be willing to delegate their democratic power to because this is really what is being asked of them. Of the many candidates, a voter may have a clear favorite but a compromise is often desired or needed to end up with a representative they are satisfied with. As has been shown above, the process of finding a compromise is not always possible to be derived even if each voter gives all information about their candidate preference. Rather than taking all information and deriving a compromise; it preferable to have a system where the voter can make a well informed clear decision of what compromises they are willing to make.

[7] It is actually an NP-hard problem to detect that this has occurred.

When the quality of a currently serving elected official is evaluated one uses approval rating. There exists a system which maximizes approval rating called Approval Voting, which was discussed in section 4.3.2. It is the logical consequence of being forced to make a compromising decision and the optimal strategic end point for honest players of any range system.

Approval voting is intuitive and simple since each voter is asked a simple question about each candidate, "Would you accept that this candidate represents you?". The candidate that gets the most approvals and hence has the highest approval rating wins. This intuitively makes sense since a binary choice is given for a desired binary output. This is nearly as simple as the current system and focuses the choice on the most generally well-liked candidate not the candidate which appeals to the largest demographic. Although, in many cases this would be the same candidate.

## 8.1 Approval Voting

The proposed system is a Proportionate system with Approval Voting as the balloting method. The choice of Proportionate and Approval was made because they are relatively free of undesired consequences.

Proportional Representation is not desired. As discussed above there is no clear motivation to move to an explicitly partisan system other than perceived fairness to parties. Similarly, a partial move to a mixed system would not have a net benefit. Proportional Representation systems and mixed systems are not the only systems with some measure of Proportional representation. Proportional Representation systems are those systems which force nearly proportional results. The result being a shift of power to the parties from the citizen and particularly from those citizens whose representational power was weak to begin with. Having proportional representation is not a bad thing, but the side effects of the methods used to force it into systems are. Approval Voting does tend to be more proportional than SMP so those worried exclusively about their party would get change to a more proportional system while maintaining 100% proportionate representation.

Ordinal voting is undesirable strictly for mathematical reasons. There is no way to aggregate ranks into a single result which does not have the numerous undesired effects. STV is a particularly good example of a poor system, as it is a perfect storm of issues. Cardinal Voting is the only class of systems possible if one cares about mathematically consistent (predictable by voters) results.

Within Cardinal Voting there are many possibilities remaining but Approval Voting was chosen for a number of reasons. Approval Voting is the simplest and most mathematically consistent system of balloting. Strategic players of Range Voting will tend to rank all candidates with either the maximum of minimum value. This choice maximizes their expected outcome but also reduces the system to Approval Voting. It then would make sense to make Approval Voting the system in the first place and then strategically unskilled players will do equally well.

In Approval Voting, the most well-liked candidate wins so this forces the representatives to represent their whole electorate in practice and not to pander to the political base of the party they are in. The candidate chosen may not be anyone's first choice but they are the candidate which most people feel they have their interests represented by. It is a simple system of compromise.

To reiterate, the major advantages are:

1. Approval voting can allow voters to cast a compromise vote without abandoning their favorite candidate. This means no vote splitting and no spoiler candidates.
2. If voters are sincere, candidates trying to win an Approval Voting election might need as much as 100% approval to beat a strong competitor, and would have to find solutions that are fair to everyone to do so. However, a candidate may win a plurality race by promising many perks to a simple majority or even a plurality of voters at the expense of the smaller voting groups.
3. In many cases, Approval Voting will elect a candidate that has greater overall utility than a candidate preferred by a mere majority, if the majority also approves a compromise candidate that includes representation of the minority. This is an example of how failing the *majority criterion* lowers *Bayesian Regret*.
4. If a candidate is elected and becomes unable to perform their duties then there would be no need for a second election to find the next most popular candidate.
5. This system is relatively immune to partisan politics. Normally a candidate only stands a chance if they are chosen to run by a major political party. Voting for an independent to raise awareness is a potentially noble thing to do in a plurality system but ultimately one does not expect that candidate to win. The hope would be to get the attention of a major party by voting for a one issue candidate. This ability is exaggerated by Approval Voting and hidden by the complexity of STV.
6. In this system, a good independent has a much better chance of winning than any other system which is likely why it is normally ignored by parties trying to push through partisan representation.
7. Approval Voting is optimized so that the maximum number of members in the assembly were voted for by the electorate. This essentially solves the issue of wasted votes which spurs people to propose Proportional Representation. In short Approval Voting maximizes the representation of the populous.
8. It has *Monotonicity Criteria* which is an even stricter requirement than *Independence of Irrelevant Alternatives*.
9. As with all Cardinal Methods Arrow's *Impossibility Theorem* does not apply.
10. Approval voting passes the *participation criterion* so there is never any harm in voting. Additionally, as discussed above the keen candidate is encouraged to look for unrepresented groups who voted for a single-issue candidate and incorporate their ideas.
11. While the *Gibbard–Satterthwaite theorem* still applies, strategic voting is much less advantageous in approval voting than any other system discussed.
12. Range voting has the lowest Bayesian Regret among all common single-winner election methods. Approval Voting does not minimize Bayesian Regret among Range Voting systems but it is better than any rank voting system.

13. A divided constituency is unstable in Approval Voting because a candidate with a moderate position will always beat both candidates. This implies a tendency towards many voters receiving a candidate they voted for.
14. While not strictly true, approval voting tends to elect *Condorcet Winners* in practice so it is clear that it is a fair system.
15. The decreased importance of "convincing voters you can win" (as opposed to "convincing them you are the best") may decrease the importance of money in elections. Together all this means that votes are never split and the incentive for strategic voting is severely reduced relative to the balloting method discussed already.

While it may seem Approval Voting is a nearly perfect system there are some detractors. The most common objection is that it fails the *later-no-harm criterion.* It is a more strict requirement than the *Favorite Betrayal criteria* Approval Voting satisfies. The *later-no-harm criterion* is satisfied if, in any election, a voter giving an additional ranking or positive rating to a less-preferred candidate cannot cause a more-preferred candidate to lose. This is a clear result of the fact that Approval Voting is a system intended to find a compromise. If one desires the compromise candidate to win over two polarizing candidates this is not a problem. If one would rather find the most preferred polarized candidate this is a problem. In the view of minimizing *Bayesian Regret* a compromise candidate winning is preferable.

Since Approval Voting has a bias towards compromise some have argued that it would be better to use the unbiased Range Voting with a larger number of gradations. Range voting is unbiased so it would not produce a compromise candidate in as many situations as Approval Voting. Similarly, since SMP and Rank Voting is biased toward polarization they produce less compromise than Range Voting. The *later-no-harm criterion* and *majority criterion* are only satisfied in polarized systems where a compromise candidate never wins.

## 8.2 Government formation

After the members are selected the next task would be to select the Leader of the Government and the Leader of the Opposition from within them. Currently in Canada, the leader of the government is normally also the leader of Canada's most successful political party; unless a coalition if formed. They must maintain the Confidence of the House and this is normally simple if their party holds the majority.

There is no desire for this to be the method if a better method could be found. When designing a selection method, the goal would be to select a broadly appealing member as the leader and another which opposes their general stance to lead the opposition. The most polarizing systems are Single Plurality Voting and Rank Voting. However, in both these systems it is highly likely that the winner and runner-up would be leaders of parties. If the idea is to find a candidate who can get the highest approval of the house, a different system must be used.

Unlike in general elections where multiple rounds would be logistically and economically unfeasible this is not the case for elections within the assembly. One could have one vote to elect the leader, and then from the remaining members a second to elect the leader of the opposition. It is suggested that a form of Range Voting would be optimal for this. It would be desirable that the

leader of the opposition is chosen by those members who did not vote for the leader of the government as it would optimize polarization. In a Range Voting system with more than two gradations it becomes unclear who those members should be. As such, it is suggested that Approval Voting be used for this as well. It is also suggested that the vote be public and open so the electorate can see who their representative supported. The leader of the opposition would also then be chosen by approval voting.

The consequences of strategic voting for Approval Voting would be for all members to vote for any member they actually could work with. This would be all members of their own party and for all but the largest party several select candidates from other parties. Typical results would be the same as the current system but in a minority of cases a more unifying leader would be chosen.

This system does make a large change in that being an independent would not be nearly as detrimental. There could arise situations where the vote for the leader came down to the independents. The independent's ability to choose any member without being restricted by a party could in fact give an independent more power than they would have when in a party.

While this is a less partisan system than the current system, one should not expect political parties to disappear under this region based Approval Voting system. If there are ideological rifts inside parties they may split into smaller parties which are more ideologically homogeneous. The current SMP system tends to force parties to merge but this method of government formation with Approval Voting gives no advantage for two small parties to merge.

In many ways, political parties are needed. Constructing a budget is a large enterprise and this requires many MPs and supporting staff over a long period of time. Such enterprises are worked on by each party long before the election. In this system, parties and candidates are free to associate and endorse one another as they see fit. To ensure that the candidate is who is being voted for only the names of the candidate should appear on the ballot. To maximize their chances, large parties would be wise to support multiple candidates in each riding with slightly different positions.

### 8.3 Special interest issues

Approval voting does tend to represent a very high percentage of the population and can even tend to weight minority issues highly. Even so, this system is proposed to have several special interest seats to ensure that no important issues are missed. As stated above for such a seat to be tenable there must be several restrictive criteria placed on its acquisition. First, a candidate for this must be unassociated to a party to prevent already represented partisan issues from taking the seat from minority issues. Since these seats are intended to represent the unrepresented, a voter should only be able to vote for one of these national representatives if they voted "none of the above" in the regional ballot. In Approval Voting, this is equivalent to not approving any candidate.

Furthermore, all candidates who would like to run for a national seat must write a proposal outlining the issue. This would be a proposal for an action, not a proposal to research a problem

or find a solution. The proposal to “eliminate poverty” would be highly endorsed but is a goal not a proposed action. A proposed action that would eliminate poverty could be to “modify the taxation system to add a negative tax”. The issue or proposal would be what is voted for so the title or a summary would be on the ballot. This would help to prevent the seats from going to candidates with broad identarian or ideological ambition. For an extreme example, a white nationalist may be able to rally the fraction of a percent support nation wide without stating their goals explicitly since they would only need a small fraction of the population to vote for them to gain such the seat. However, if they were to be required to present a particular policy and legislative change, the starkness of the proposal would hopefully undermine support.

A seat obtained through this method would not have any consequences for the adoption of the proposal. This is merely intended to give that proposal an advocate in the assembly. The number of seats allocated for this should not exceed a few percent. Ideally the winning issues would have an equivalent number of votes as the regional representative. This would be difficult to estimate for the first election but subsequent elections could be based on the value of the first. For voting on bills all members of the assembly would have an equal vote as in the current system. This would include special interest members. Similarly, these members would have the same voting rights when selecting the Leaders of the governmental

## 9 Conclusion

In this paper, a review of the most commonly suggest methods for constructing a representative government have been given with their benefits and disadvantage. Due to a number of clear disadvantages ordinal (rank) voting and Proportional (Partisan) Representation were independently eliminated as possible components to be used in a reformed electoral system. Ordinal voting was eliminated due to the mathematical inconsistencies which result from aggregating ranks. Proportional Representation was eliminated because it gives more power to political parties at the cost of the most disempowered.

This then leaves Cardinal Voting with Proportionate (Regional) Representation. The simplest such system, Approval Voting, is both practicable and laudable. Approval voting is extended with the addition of a formal system of government formation and several special interest seats. These two more progressive suggestions are not essential to the system. Their removal results in the standard Approval Voting system which is still a much better system than all others discussed. Furthermore, relative to the current system there is minimal changes in the running of elections required so the logistics of implementation would be small when compared with other options.

While Approval Voting is a relatively progressive suggestion many places already use it. The United Nations uses Approval Voting to elect its secretary general. Many mathematically conscious organizations such as Mathematical Association of America, American Mathematical Society and American Statistical Association use it. Also, two organizations, The Society for Judgment and Decision Making as well as The Society for Social Choice and Welfare, use approval voting. These are the organizations for the people who study voting systems and they use Approval Voting for their internal elections.