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77LCB08 -- Voting System Reform

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A Bill to Change the CUSG Voting System from Plurality to Approval

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Motivation

Of all popular voting systems, Plurality voting systems are universally considered by voting system experts to be the worst in terms of electing the most preferred candidates. That is a strong statement, but it is warranted considering the dearth of academic work in support of Plurality systems. As a Democratic institution, CUSG should do everything in its power to facilitate and improve upon the Democratic process. Voting systems around the world are moving away from Plurality, and it's only a matter of time before it is no longer the dominant system being used in America.

There are many decent to good alternatives to Plurality voting. Instant Runoff Voting (IRV) is used extensively around the world, including government elections at all levels. Condorcet voting guarantees that the pair-wise most preferred candidate will get elected (with honest voting). Borda Count voting is used prominently in ranking systems like the AP Top 25. Range or Score voting is used in athletic competitions like figure skating, awards competitions, student admissions, etc. Approval voting is used all over, from elections to game shows to competitions like American Idol, and it is the simplest system possible, short of random ballots.

Below is a short description of some of the specific problems with Plurality voting, followed by how an Approval system avoids those problems and why it is preferred in this case as opposed to other alternatives.

Plurality Voting

The system currently being used for CUSG elections is a simple Plurality system known as First-Past-the-Post (FPP). In this system, every eligible voter is able to cast one vote for each position up for election. The person receiving the most votes for a given position wins the election [1]. The relevant problems with this system are as follows::

1. **Condorcet Winners [2] are frequently not elected in Plurality systems, and Condorcet Losers [3] are frequently elected.**

The Condorcet Winner is the candidate that would win a pair-wise election against all other candidates on the ballot. The Condorcet Loser is the candidate that would lose a pair-wise election against all other candidates on the ballot. How is it possible that a Condorcet Loser could get elected?

(The following is an except from [3]):
Imagine that Tennessee is having an election on the location of its capital. The population of Tennessee is concentrated around its four major cities, which are spread throughout the state. For this example, suppose that the entire electorate lives in these four cities, and that everyone wants to live as near to the capital as possible.
The candidates for the capital are:
- Memphis, the state's largest city, with 42% of the voters, but located far from the other cities
- Nashville, with 26% of the voters, near the center of Tennessee
- Knoxville, with 17% of the voters
- Chattanooga, with 15% of the voters

The preferences of the voters would be divided like this:

42% of voters (close to Memphis)	26% of voters (close to Nashville)	15% of voters (close to Chattanooga)	17% of voters (close to Knoxville)
1. **Memphis** 2. Nashville 3. Chattanooga 4. Knoxville	1. **Nashville** 2. Chattanooga 3. Knoxville 4. Memphis	1. **Chattanooga** 2. Knoxville 3. Nashville 4. Memphis	1. **Knoxville** 2. Chattanooga 3. Nashville 4. Memphis

Here, Memphis has a plurality (42%) of the first preferences, so would be the winner under simple plurality voting. However, the majority (58%) of voters have Memphis as their *fourth* preference, and if two of the remaining three cities were not in the running to become the capital, Memphis would lose all of the contests 58–42. Hence, Memphis is the Condorcet Loser.

2. **Candidate clones [4] have a significant impact on Plurality elections.**

Let's say there are two candidates A and B and that 60% of the voting population supports A and 40% supports B. We should expect candidate A to win 100% of the time. However, if a third candidate virtually identical to candidate A, say clone-A, is

added to the ballot, then it's highly likely that candidate A supporters will split their votes between A and clone-A. Thus, even though an overwhelming majority of voters prefer a candidate like A, candidate B has a good chance of winning the election in this case.

3. Plurality systems encourage tactical instead of honest voting [5].

If a voter prefers a candidate that has no chance of winning the election, then there is little reason for that voter to honestly vote for that candidate; such voters are highly likely to vote for the "lesser of two evils" between the two candidates that are most likely to win. This tactical voting obscures the true preferences of the electorate and the policies that they support, and leads to two-party dominance (Duverger's Law [6]).

4. Plurality systems perform the worst among popular voting systems in computer simulations and mathematical analyses.

Warren Smith in 2000 simulated the performance of popular election methods in minimizing a metric called Bayesian Regret which effectively measures how far-off the election method is in electing the most preferred candidate [7]. Below is a sample chart of one of the simulated environments:

Bayesian Regrets of Election Methods
5 candidates, 200 voters, 2 issues. Arbitrary units.
Random winner
Instant Runoff
Honest voters
Condorcet
Borda
Strategic voters
Approval
Plurality
Currently used, USA
Range
"Magic" best winner
Worse
Bars show honest & strategic regrets (left & right); smaller reget is better.
Smith 2000, Poundstone 2008

Smith tried 720 different simulated voting environments, and the results were all similar to the chart above. The main conclusion to draw from this is that Plurality is clearly the

worst voting system, and there is a significant amount to be gained by moving to an alternative.

There are other problems with Plurality voting that don't apply to CUSG elections, and so they will not be addressed.

Approval Voting

Approval voting allows voters to vote for any number of candidates for a particular position; essentially, voters indicate which candidates they approve of for a position, the others being implicitly disapproved of for that position. Why is Approval voting a better system than Plurality?

1. **Condorcet Winners are frequently elected in Approval systems.**

This result was shown in [9]. If all voters have perfect information about each other's true preferences and use rational strategy, any Condorcet or Majority winner will win in the Nash equilibrium. In particular if every voter knows that "A or B are the two most-likely to win" and places their "approval threshold" between the two, then the Condorcet winner, if one exists and is in the set {A,B}, will always win. Approval voting also satisfy the Majority criterion [10] in the weaker sense that any majority can force their candidate to win, if it so desires.

2. **Approval voting is immune to candidate cloning.**

This result is obvious upon inspection. There could be 10 identical candidates and 1 other unique candidate, but supporters of the identical candidates don't have to worry about vote splitting because they can simply vote for all of them. To the extent that the clones aren't identical, voters have the flexibility to pick and chose among the clones. Under a Plurality system, however, the unique candidate is more and more likely to win as the number of clones of opposing candidates increases.

3. **Approval systems encourage honest as opposed to tactical voting.**

If a voter prefers a candidate that has no chance of winning, it is not a waste to vote for that candidate, because the lesser-of-two-evils can also be voted for. This allows weaker voices to be heard and more accurately represented through the vote count.

4. **Approval systems do very well in computer simulations and mathematical analyses.**

The more freedom voters are given to express themselves through a vote on the ballot, the more likely an election system will be able to elect the universally most satisfactory candidate. Range or Score voting is the most expressive in that it allows voters to indicate a level of preference for each candidate. As voting in a Range system becomes more and more tactical, it approaches an Approval system. In fact, Approval voting is

just a special case of tactical Range voting. As voting in an Approval system becomes more and more tactical, it approaches a Plurality system. Voters in general are neither perfectly tactical nor perfectly honest, so in practice Approval voting is somewhere in between Range and Plurality voting in terms of electing the most preferred candidates, and this is evident in simulations and the chart above.

Why Approval and not some other system?

As noted in the previous paragraph, Range voting seems superior to Approval voting, so why not use that system? The only reason not to use Range instead of Approval voting is simplicity: Range voting is much more complex than Approval voting. In fact, IRV, Condorcet, Borda Count, and all other systems are necessarily more complex than Approval. In an Approval system, there is no such thing as an invalid ballot because there is no rank ordering, or limit on the number of valid votes, or scoring. Since there are no invalid ballots, there does not need to be any ballot validation mechanism. Also, all other systems (other than Plurality) require more complicated tallying and resolution algorithms, and thus are more difficult for voters to follow and understand. Approval voting is dead simple to tally, resolve, and understand, and that is the main reason why it is preferred to other alternatives.

Some Groups that use Approval Voting [11]:
- Mathematical Association of America
- American Mathematical Society
- Institute for Operations Research and Management Sciences
- American Statistical Association
- Society for Judgment and Decision Making
- Social Choice and Welfare Society
- International Joint Conference on Artificial Intelligence
- Public Choice Society
- European Association for Logic, Language and Information
- Econometric Society
- National Academy of Sciences
- United Nations
- San Francisco State University's Academic Senate

References

1. Plurality Voting System, http://en.wikipedia.org/wiki/Plurality_voting_system
2. Condorcet Winner Criterion, http://en.wikipedia.org/wiki/Condorcet_criterion
3. Condorcet Loser Criterion, http://en.wikipedia.org/wiki/Condorcet_loser_criterion
4. Independence of Clones Criterion, http://en.wikipedia.org/wiki/Independence_of_clones_criterion
5. Alex Small, "Geometric construction of voting methods that protect voters' first choices," arXiv:1008.4331 (August 22, 2010), http://arxiv.org/abs/1008.4331.
6. Duverger's Law, http://en.wikipedia.org/wiki/Duverger%27s_Law
7. Bayesian Regret, http://scorevoting.net/BayRegDum.html
8. Tactical Voting, http://www.electology.org/tactical-voting
9. Laslier, J.-F. (2006) "Strategic approval voting in a large electorate," *IDEP Working Papers* No. 405 (Marseille, France: Institut D'Economie Publique).

10. Majority Criterion, http://en.wikipedia.org/wiki/Majority_criterion
11. Approval Voting, http://www.electology.org/approval-voting
12. "The Global Distribution of Electoral Systems". Aceproject.org. 2008-05-20.
13. "Approval Voting in Practice", by Steven J. Brams and Jack H. Nagel.
14. http://rangevoting.org/Approval.html
15. http://www.ctl.ua.edu/math103/voting/approval.htm

Bill Summary

This bill effectively changes the CUSG voting system from Plurality to Approval.

THEREFORE BE IT ENACTED:

Section 1: § 304(a)(4) of the CUSG Election Code shall be changed
　　FROM: (4) A ballot that allows the voter to select a number of candidates equal to the number of positions to be filled in accordance with § 303.
　　TO: (4) A ballot that allows the voter to select any number of candidates for a position.

Section 2: Appends a new Section to the Election Code Section 303: Office (c), which states:

"No candidate shall advocate for other tickets in the form of asking voters to vote for other tickets or through sharing financial resources."

Section 3: Appends a new Section to the Election Code Section 303: Office (d), which states:
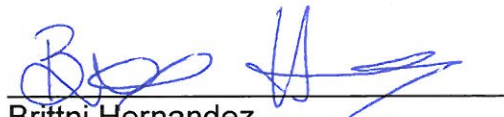
"On each individual ticket no more candidates than the number of seats available for an election for each type of position shall be permitted to run."
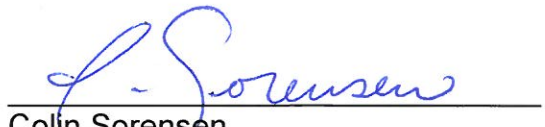
Section 4: This bill shall take effect upon passage by the Legislative Council and upon either obtaining the signatures of two Tri-Executives or the lapse of six days without actions by the Tri-Executives.

Vote Count

08/16/2012	**Passed on 1st reading**	**10-2-3**
08/23/2012	**Amendment to evaluate after fall elections**	**2-8-6**
08/23/2012	**Motion to postpone to next meeting**	**4-7-5**
08/23/2012	**Motion to recess to work on wording**	**5-6-5**
08/23/2012	**Amendment to add Section 2**	

08/23/2012	Motion to change amendment	8-2-6
08/23/2012	Final vote on amendment to add Section 2 (with revision)	8-0-8
08/23/2012	Motion to refer to Election Committee	Acclamation
09/21/2012	Section 2 removed by Election Committee	4-0-2
09/21/2012	Passed out of committee for 2nd reading	3-1-2
10/04/2012	Override President Sorenson	12-4-1
10/04/2012	Call previous question	3-13-1
10/04/2012	Amended to add Section 2/advocacy	Acclamation
10/04/2012	Amended to add Section 3/numbers	Acclamation
10/04/2012	Amended to add logo to bill	Acclamation
10/04/2012	Passed on 2nd reading, as amended	12-4-1

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