URCVT 1.2.0 110.1-NY Tabulation Options for RCV Tabulation 1.0.0

URCVT v.1.2.0 110-NY Tabulation Options for RCV Tabulation v.1.0.0 document is solely for use in the State of New York. This document can be expanded or updated as is necessary or required. Any recommendations listed in this document should not supersede user jurisdiction procedures or other controlling governance entities.

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The following is an enumeration and discussion of the various tabulation options that exist for Ranked Choice Voting (RCV) elections. Most of these functions occur outside of the public eye, i.e., within the tabulation process rather than the voting or results reporting process. Some, however, are of significance to voters, candidates and administrators and involve policy decisions on the part of those crafting the statutes or rules governing any implementation of Ranked Choice Voting.

While we do not make recommendations regarding which of these variants to use, we have tried to outline, in the discussion, some of the implications each option may have on whether or how a voter's choice(s) is/are counted and on any administrative requirements affected by some of these options.

1. Termination of tabulation (single-winner)
    a. Declare winner if a candidate receives a majority of 1st choice votes in the initial count. (Minneapolis, State of Maine)
    b. Declare winner when a candidate receives a majority of valid votes in any subsequent round (Minneapolis, St. Paul, State of Maine, Oakland, San Leandro, Berkeley, Portland, ME., Takoma Park, MD., Santa Fe)
    c. Declare a winner when only two candidates remain. (San Francisco, CA. Senate Bill 212, 2019)

While any candidate achieving a majority of votes under (a) or (b) will also be the winner under (c), the latter provides a more complete picture of the strength of support for the winner across all voters. While there is some incentive to choose option (a) if it saves on the cost of accumulating all cast vote records (CVRs) for RCV tabulation, if the CVRs are readily available, fully automated tabulation systems can go from (a) to (c) in seconds. This makes stopping the tabulation at (a) or (b) largely irrelevant. Option (c) appears to be trending.

2. Overvotes (two or more candidates marked with the same ranking)
    a. Skip to next highest ranked candidate (Minneapolis, St. Paul)
    b. Exhaust ballot (San Francisco, Berkeley, Oakland, State of Maine, Santa Fe, CA Senate Bill 212, 2019)
    c. Exhaust ballot unless only one overvoted candidate is a continuing candidate (Takoma Park, MD)
    d. Suspend ballot until only one overvoted candidate is a continuing candidate then cast vote for that candidate or any subsequent highest ranked continuing candidate. (Not currently used)

Options (a), (b), and (c) are in use in current RCV jurisdictions. The argument in favor of exhausting the ballot, option (b), is that this makes no judgements about voter intent. An error is an error and that terminates the ballot. While this is consistent with the treatment of overvotes in conventional plurality elections, RCV offers other valid options that keep a voter's ballot alive.

Skipping to the next highest ranked candidate, option (a), is also used in a number of jurisdictions. This acknowledges the error but does not make it a terminal error. It simply treats the next highest ranked choice as the first valid choice, which also avoids imposing any outside judgement about voter intent.

Exhausting the ballot unless only one overvoted candidate is a continuing candidate, option (c), simply acknowledges that no overvote exists if only one of the marked candidates is a continuing candidate. This is because each round of tabulation only looks at votes for continuing candidates and ignores candidates that have been eliminated. There is, however, an inequity in this method in that it has unintended effects depending on the ranking at which the overvote occurs. No candidates are eliminated prior to the first round of tabulation, thus, any overvote at the first-choice level would exhaust the ballot where an overvote at a later round might not exhaust the ballot.

Option (d) is suggested as a means of eliminating the inequity of the different treatment of overvotes in different tabulation rounds. This option appears to maximize the opportunity for a voter's ballot to be counted and counted as that voter intended. It should be noted; however, this option has not been and is currently not used in any RCV jurisdiction.

3. Skipped rankings
    a. Skip to next highest ranked candidate (Minneapolis, St Paul, San Francisco, Berkeley, Oakland, Santa Fe)
    b. Exhaust ballot (CA. Senate Bill 1288, 2017)[1]
    c. Exhaust ballot if consecutive skipped rankings are encountered (State of Maine, Takoma Park, MD., CA. Senate Bill 212, 2019)

Skipping to the next highest ranked continuing candidate without a limitation in consecutive skips, option (a), runs the risk of casting a ballot for a voter's last choice candidate if they rank only their first and last choices and the first choice is eliminated. *

While exhausting a ballot after consecutive skipped rankings, option (c), minimizes this prospect of option (a), it does not entirely eliminate it (e.g., three candidates competing for one seat). Exhausting a ballot when a skipped ranking is encountered, option (b), again penalizes the voter in a draconian manner for what may be a simple oversight.

Option (c) appears to minimize the potential adverse effects while maximizing the opportunity for the voter's ballot to be counted as intended.[2]

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[1] This rule variant is not contained in the 2019 version of the proposed California statute and is not used in any current RCV jurisdiction.

[2] Certain scenarios lead to the possibility of a voter's ballot being cast for his or her last choice. Where all candidates are ranked, this would appear to cast a vote for the voter's least desired candidate, which seems contradictory to the principle of "voter intent." One possible solution is a rule that states:

> "Where the ranking options allow all candidates to be ranked, no ballot shall be counted for the candidate ranked at the highest available ranking."

4. Repeat rankings of the same candidate (sometimes referred to as duplicate ranking)
    a. Ignore repeat rankings (Minneapolis, St. Paul, State of Maine, Oakland, San Leandro, Berkeley, Portland, ME., Takoma Park, MD., Santa Fe)
    b. Exhaust ballot at repeat ranking (CA. Senate Bill 1288, 2017)[3]

This is actually a non-issue unless a jurisdiction elected to treat repeat rankings as a skipped ranking (which is currently not done anywhere). A standard tabulation algorithm will not detect a repeat ranking unless or until the candidate is eliminated. Once eliminated, the algorithm will simply look for the next highest ranked continuing candidate and will pass over the repeat ranking as it would any other eliminated candidate.

The practice of exhausting a ballot when a repeat ranking is encountered, option b, appears to emerge from a position that all voter "errors" should invalidate a ballot.

5. Ties among last place candidates
    a. Decide by lot (Minneapolis, St. Paul, State of Maine, San Francisco, Oakland, San Leandro, Berkeley, Portland, ME., Santa Fe, CA Senate Bill 212, 2019)
    b. Most votes in previous round (Takoma Park, MD)
    c. Predetermine tiebreaking order and include in configuration or algorithm. (Allowed in State of Maine)

Last place ties pose a different kind of challenge in RCV elections than encountered in plurality elections. Here, time is of the essence since continuation of the tabulation is dependent upon resolution of a tie to determine which candidate is eliminated. Many states require that tied candidates be present for a tie resolution, something that is not desirable in RCV last place ties where a tie must be broken before the tabulation can proceed.

Fortunately, the law regarding option (a) is often very generally stated in statute or ordinance and allows for option (c) to be used. Predetermined tiebreaks or the incorporation of a randomized tie breaking utility within the algorithm is the recommended approach. Option (c) also fits neatly into an auditing regime, where ties must be broken the same way every time. While "most votes in the previous round" generally is an easy, built in tie-breaking mechanism, it suffers from one major drawback: it may violate the one-person-one-vote principle. This is due to the fact that it gives heavier weight to votes in the previous round than to votes in the current round in deciding who advances and who is eliminated. While this has not yet been litigated, it opens the door to that prospect.

6. Last round ties
    a. Decide by lot (Minneapolis, St. Paul, State of Maine, San Francisco, Oakland, San Leandro, Berkeley, Portland, ME., Santa Fe)
    b. Most votes in previous round (Takoma Park, MD)
    c. Predetermine tiebreaking order and include in configuration or algorithm. (Allowed in State of Maine)

This rule would not be applied if the number of rankings available was less than the number of candidates. Presumable, any candidates left unranked under such a scenario would be less preferred than the last candidate receiving a ranking.

[3] This rule variant is not contained in the 2019 version of the proposed California statute and is not used in any current RCV jurisdiction.

Last round ties in RCV elections are very similar to ties in plurality elections. Time is not of the essence here so traditional tie breaking protocols may be employed if desired.

The option of using "most votes in the previous round" here is likely more problematic than in last place tie situations in that a tie break for the win is more likely to be subject to litigation.

7. Multi-winner RCV threshold calculation
    a. Whole number threshold (Minneapolis, Cambridge, MA.)
    b. Fractional threshold (CA. Senate Bill 1288, 2017, CA. Senate Bill 212, 2019)

Multi-winner RCV uses a calculation based on the number of seats to be elected to determine what share of the votes cast in an election a candidate needs in order to win election. That threshold is set by the formula $T \geq B/(S+1)+1$ (for whole number thresholds), and $T \geq B/(S-1)+n$ (for fractional thresholds)

T = Threshold
B = Number of Valid Ballots Cast
S = Number of Seats to be Filled
n = a fraction greater than 0 and less than 1

In percentages, this means the threshold in a three-seat election is 25%+, a four-seat election is 20%+, a five-seat election is ~16.67%+, and so on.

While single-winner contests under options 1(a) and 1(b) involve whole number thresholds, i.e. one vote more than a majority, multi-winner contests may use either whole number or fractional thresholds. This is due to the use of surplus transfers in multi-winner contests to credit a proportional share of extra votes a candidate receives (those above the threshold) to the next highest ranked choice on ballots cast for a winner.

Fractional thresholds provide for a higher degree of precision in deciding winners or eliminations. For instance, in a three-seat contest where 300 votes are cast, would the threshold be 101, 100.1, 100.01, 100.001, etc. votes? In most elections, such precision would make no difference, however, there are certainly cases where fractions of a vote could make the difference between winning, losing or tying. This is particularly true in small elections or where there are numerous candidates, many of whom have weak support and the order of elimination is important.

Some jurisdictions define the threshold as $T > B/(S+1)$ in which case the winner must receive a vote total greater than the threshold rather than greater than or equal to.

8. Multi-winner RCV surplus transfers
    a. Fractional transfers (Minneapolis, CA. SB 1288, 2017, CA. SB 212, 2019)
    b. Whole ballot transfer (Cambridge, MA.)

Candidates elected in multi-winner RCV elections frequently receive more votes than they need to win election. These votes in excess of the threshold are called "surplus votes."

To ensure proportionality in multi-winner RCV elections, those surplus votes are transferred to later-ranked candidates on ballots counting for the candidate with a surplus. There are two main methods of surplus transfer:

i. Whole ballot transfers, where whole votes (each counting for one vote) transfer to a different candidate, instead of counting for the candidate with a surplus, until the candidate with a surplus has only as many votes as required by the threshold; or,

ii. Fractional transfers, where a fraction of every vote counting for a candidate with a surplus is transferred to later-ranked candidates on those ballots, until the candidate with a surplus has only as many votes as required by the threshold.

Whole ballot transfers are currently used in Cambridge, MA elections. Whole ballot transfers are disfavored because they are not guaranteed to proportionally distribute a candidate's surplus to the other candidates ranked on each voter's ballot.

Fractional transfers are currently used in Minneapolis, MN elections using a transfer method known as the "Weighted Inclusive Gregory Method" (WIGM). Here is a brief example showing how that transfer method works:

Take a three-seat election with 100 votes cast. The threshold is 25+, from the formula T≥100/(3+1)+n.

The Threshold is the number of valid ballots (B) divided by the number of seats to be filled (S), plus 1. n, as noted above, is some small amount between zero and one. In this case the threshold could be a fraction of a vote more than the 25 votes in our example.

How do we obtain a fraction of a vote?
First, Calculate a "Surplus Fraction." This is the candidate's extra votes (above the threshold) / the candidate's total votes.

Surplus Fraction (SF) = Candidate's extra votes/Candidate's total votes
eg: T = 25+, Candidate's total votes = 31
SF = (31-25)/31 = 6/31 = .1935[4]

With a threshold of 25 votes and a candidate who received 31 votes, the surplus fraction would be 6/31 or .1935.

This becomes the "Transfer Value" to apply to each ballot's share of the surplus.
Next, each of the 31 voters' next highest ranked choice receives .1935 of a vote as the "transfer value" of the surplus.

[4] Minneapolis rounds fractions down to four decimal places.

This "transfers" 5.9985 (31 x .1935) votes to other candidates, leaving the winning candidate with 25.0015 votes, which is >25 or the Threshold.

No preferences are wasted, the order of counting is not a factor and each voter's ballot shares equally in the surplus.

If two or more candidates cross the threshold with a surplus and have surpluses of the same size, a tie-breaker will be needed to determine whose surplus transfers first. The tie-breaking protocols laid out in sections 5 and 6 are sufficient here.

If the last seat(s) in a multi-winner contest is filled and a vote surplus exists, this surplus should be redistributed leaving all candidates with vote totals equal to the threshold. In general, neither the size of a vote surplus nor the order in which candidates are declared elected has any substantive meaning in multi-winner elections. What is important is which candidates achieve the threshold number of votes. In our example, 25.0001 would be the smallest number > or = (≥) to 25, thus, all winners would receive 25.0001 votes and any remainder would be a “residual surplus” (not counting for any candidate) due to rounding.

There are other methods of fractional surplus transfer, but none are used in the United States, so we do not cover them here. All international uses of multi-winner RCV (in Australia, Ireland, Malta, New Zealand, Northern Ireland, and Scotland) use fractional transfers.

Document Revision History

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