

The New Zealand method of counting single transferable votes

Detailed description of the count

At each stage in the count, each candidate has an associated “keep value”, which indicates the proportion of every vote, or part of a vote, received by that candidate which is kept, the remainder being transferred. Each candidate’s keep value (KV) is initially set to 100% and it does not change until that candidate is either elected (when it is reduced below 100%) or excluded (when it is permanently reset to 0%).

Each time the votes are counted, it is done in the following way. Suppose that candidate A’s KV is 80%, candidate B’s is 50%, candidate C’s is 100% and candidate D’s is 0%. (These values indicate that A and B are already elected, that C is still “hopeful”, and that D has been excluded.) Then, a voting document listing DCAB (in that order) would be counted as—

nothing to D,
100% of a vote to C,
nothing to A or B (because C has taken the lot).

A voting document listing ABC (in that order) would be counted as—

80% of a vote to A,
10% of a vote to B (i.e. 50% of the remaining 20%),
10% of a vote to C (i.e. 100% of the remainder).

A voting document listing BDAC (in that order) would be counted as—

50% to B,
nothing to D,
40% to A (i.e. 80% of the remaining 50%),
10% to C (i.e. 100% of the remainder).

After each count of the votes, the current quota is calculated as—

(number of votes currently assigned to candidates)
divided by (number of vacancies plus 1)

where the number of votes currently assigned to candidates is the total number of valid votes cast, minus the number regarded as non-transferable.

Any candidate whose votes equal or exceed the current quota is elected (if not already elected earlier) and given a new KV, calculated as—

(candidate's current KV) multiplied by (current quota)
divided by (candidate's current votes).

Thus, taking the BDAC vote as an example, the calculation for candidate A might be 80% multiplied by the current quota of (say) 120 (which equals 96), divided by A's current votes of (say) 128, giving a new KV of 75%. The calculation for candidate B might be 50% multiplied by the current quota of 120 (which equals 60), divided by B's current votes of (say) 125, giving a new KV of 48%.

After every such change, to one or more candidates, the votes are recounted using the new KVs. This has the effect of transferring the surplus votes of all the elected candidates in accordance with the voters' later preferences.

The BDAC vote would then be recounted as—

48% to B,
nothing to D,
39% to A (i.e. 75% of the remaining 52%),
13% to C (i.e. 100% of the remainder).

It will be noted that candidate C's share of this particular voting document has risen from 10% to 13%, as elected candidates B and A shed further surplus votes. When similar increases across the other voting documents that currently point to C are all added together, C will have an increased number of total votes at the conclusion of that count.

If, at the end of any count of the votes, no surplus remains, but the number of candidates elected so far falls short of the number of vacancies to be filled, then the candidate who currently has fewest votes is excluded, and that candidate's KV is reset to 0%. The votes are then recounted.

It is usually clear before all surpluses are transferred that an exclusion will be required, and which candidate it must be. In such cases the exclusion may be made at once, giving a short cut which cannot change the final result of the election.

If candidate C were to be excluded, the remaining value of the BDAC voting document, after candidates B and A have received their share of it, would fall to the total of non-transferable votes, necessitating the recalculation of the current quota.

While it is clear that STV is not complicated, it must be conceded that the vote-counting process is extremely tedious. It is for this reason and this reason alone, that a computer must be used to perform this function.

How was my vote used?

If, following an STV election, the final keep values have been advised in the public notice of the official result of that election (as they should be), or have been obtained on request from the electoral officer, any voters who remember their preference orders can work out how their votes were used, as follows.

Suppose you voted for Bodkins as first preference, for Edkins as second preference, etc. and their final keep values were (published as) 0.310, 0.772, etc. as shown in the table below. The first thing to do is to make such a table with the order of preference that you actually used for the real candidates and fill in their final keep values in column **3**.

Always start with 1.000 as the first item, one line above your first candidate, in column **6**, and then in each row in turn, fill in columns **4**, **5** and **6**, using the rules shown.

Preference	Candidate	Final keep value	Previous vote remaining	Vote kept	Vote remaining
1	2	3	4	5	6
			previous (6)	$(3) \times (4)$	$(4) - (5)$
					1.000
1	Bodkins	0.310	1.000	0.310	0.690
2	Edkins	0.772	0.690	0.533	0.157
3	Atkins	0.000	0.157	0.000	0.157
4	Dawkins	0.702	0.157	0.110	0.047
5	Firkins	1.000	0.047	0.047	0.000
6	Gaskins	0.570			
7	Catkins	0.978			

When an excluded candidate appears, such as Atkins above, the keep value is 0.000, so no part of the vote is kept. When a candidate is either the runner-up or the last to be elected, such as Firkins, the keep value is 1.000, so that candidate keeps everything received and later preferences get nothing.

Column **5** shows how the vote was used. It can be seen that 0.310 of it went to help elect Bodkins, 0.533 of it went to help elect Edkins, 0.110 of it went to help elect Dawkins and the remaining 0.047 went to Firkins and, if Firkins was the runner-up, was unused. It will be seen that, although this voting document shows sixth and seventh preferences for two other elected candidates, it did not help to elect those candidates.

(The final candidate to attain the quota, and the runner-up candidate, both finish up with a keep value of 1.000, because the count terminates when all seats are filled. If Firkins was the runner-up candidate, then this voting document did not show a preference for the last-elected candidate, and vice versa.)