

This process can only stop on the bottom line, when all places are filled. At this time, all elected candidates have the quota, and a Keep Value less than one. The remaining quota is divided among one or more Runners-up, each with their original Keep Value of one. The final Keep Values provide a plausible order of merit of the candidates, low values being good. Excluded candidates could be ranked in order of exclusion, later being good. [The order of merit needs improving, to allow for multiple runners-up].

If there are short votes, a pseudo-candidate, called Non-transferable, is added at the end of each vote, and he gets what is left over. His total does not count towards the Quota.

A simple, artificial, example, with four candidates for three places, which shows the principle, is:-

Candidate →		A	B	C	D
Keep value →		5/16	1/3	15/19	1
↓Prefs↓	↓Votes↓				
ABCD	48 |	15	11	17+ 7/19	4+12/19
ABDC	48 |	15	11	-	22
BCDA	24 |	-	8	12+12/19	3+ 7/19
Totals	120 |	30	30	30	30
winners		A	B	C	-

The first two columns, ordered lists of Preferences, each with its own number of votes, are the only input. The Flow-chart, operating on them, produces the rest of the table. It can be proved that when the number of surviving candidates has been reduced to one more than the number of seats, then there is always a solution, in the sense that for each elected candidate a unique Keep Value can always be found to give each elected candidate, and the Runner-up, the Quota of votes.

The process of adjusting the Keep Values so that each elected candidate has the quota needs a lot of arithmetic, and until computers became widely available Meek was too tedious to be practicable. Once the final Keep Values have been found, it is easy to check their correctness, as in the above example. The correctness of exclusions could be checked by printing the above table immediately before each exclusion

A help in understanding Meek is to say that each elected candidate always has the quota, in the sense that as soon as they are elected the Keep Value of each elected candidate is adjusted to make this so.

The fact that Meek cannot easily be done manually raised some suspicions (even though it can be checked manually), and manual methods have continued in use, though they lack the elegance of Meek. They quite often give the same result, but where they differ the Meek result is more reasonable. New Zealand has successfully adopted Meek for local elections, and has barely heard of any other form of STV.

A longer example follows. For comparison, the results from a Borda election are also shown. If N is the number of candidates, Borda (J-C Borda, 1733-1799, who also described the Borda mouthpiece in hydraulics) gives N points for a first preference, N-1 for a second, and so on.

7 Candidates for 4 Places. 7 Voting Patterns. Quota= 350.0000

Stage No. 1 F Elected, because he exceeds the Quota, 350. All his surplus goes to G.
 Stage No. 2 G Elected, because F's surplus, 68, puts G above the Quota.
 As soon as F and G are elected their KVs are adjusted so that they each have the Quota, 350, giving the table below.

Cand ->		A	B	C	D	E	F	G	Non-Trn
Kp. val. ->		1.00000	1.00000	1.00000	1.00000	1.00000	0.83732	0.89974	
Status ->		Hopeful	Hopeful	Hopeful	Hopeful	Hopeful	Elected	Elected	1.0
Prefs.	Votes								
ABCDEFGF	123.000	123.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BCDEFGA	236.000	0.000	236.000	0.000	0.000	0.000	0.000	0.000	0.000
CDEFGAB	189.000	0.000	0.000	189.000	0.000	0.000	0.000	0.000	0.000
DEFGABC	284.000	0.000	0.000	0.000	284.000	0.000	0.000	0.000	0.000
EFGABCD	179.000	0.000	0.000	0.000	0.000	179.000	0.000	0.000	0.000
FGABCDE	418.000	6.817	0.000	0.000	0.000	0.000	350.000	61.183	0.000
GABCDEF	321.000	32.183	0.000	0.000	0.000	0.000	0.000	288.817	0.000
Totals	1750.000	162.000	236.000	189.000	284.000	179.000	350.000	350.000	0.000
		A Excluded							

Stage No. 3 A Excluded, because he is the lowest, and no Hopeful exceeds the Quota.
 Stage No. 4 B Elected, because all A's vote, 123, goes to B.
 The KV of B is adjusted to give him the Quota. Those of F and G do not need to be changed.

Cand ->		A	B	C	D	E	F	G	Non-Trn
Kp. val. ->		0.00000	0.87940	1.00000	1.00000	1.00000	0.83732	0.89974	
Status ->		Excluded	Elected	Hopeful	Hopeful	Hopeful	Elected	Elected	1.0
Prefs.	Votes								
ABCDEFGF	123.000	0.000	108.166	14.834	0.000	0.000	0.000	0.000	0.000
BCDEFGA	236.000	0.000	207.538	28.462	0.000	0.000	0.000	0.000	0.000
CDEFGAB	189.000	0.000	0.000	189.000	0.000	0.000	0.000	0.000	0.000
DEFGABC	284.000	0.000	0.000	0.000	284.000	0.000	0.000	0.000	0.000
EFGABCD	179.000	0.000	0.000	0.000	0.000	179.000	0.000	0.000	0.000
FGABCDE	418.000	0.000	5.995	0.822	0.000	0.000	350.000	61.183	0.000
GABCDEF	321.000	0.000	28.301	3.881	0.000	0.000	0.000	288.817	0.000
Totals	1750.000	0.000	350.000	237.000	284.000	179.000	350.000	350.000	0.000
		E Excluded							

Stage No. 5 E Excluded, because he is the lowest, and no Hopeful exceeds the Quota.
 There are now only two Hopefuls left, C and D. D, with 284, is ahead of C, with 237, but C is ahead of D in all the original votes except D's own. The next stage is to adjust the KVs of all non-excluded candidates so that they each get the Quota.

Cand ->		A	B	C	D	E	F	G	Non-Trn
Kp. val. ->		0.00000	0.60659	0.84135	1.00000	0.00000	0.58626	0.61620	
Status ->		Excluded	Elected	Elected	Runer-up	Excluded	Elected	Elected	1.0
Prefs.	Votes								
ABCDEFGF	123.000	0.000	74.610	40.713	7.677	0.000	0.000	0.000	0.000
BCDEFGA	236.000	0.000	143.154	78.115	14.730	0.000	0.000	0.000	0.000
CDEFGAB	189.000	0.000	0.000	159.014	29.986	0.000	0.000	0.000	0.000
DEFGABC	284.000	0.000	0.000	0.000	284.000	0.000	0.000	0.000	0.000
EFGABCD	179.000	0.000	17.242	9.408	1.774	0.000	104.941	45.635	0.000
FGABCDE	418.000	0.000	40.262	21.970	4.143	0.000	245.059	106.566	0.000
GABCDEF	321.000	0.000	74.732	40.779	7.690	0.000	0.000	197.799	0.000

Totals 1750.000 0.000 350.000 350.000 350.000 0.000 350.000 350.000 0.000

D Excluded

The above table shows how each voter's vote is distributed among the candidates. In particular, it shows that the views of voters who voted for D, the runner-up, are not well represented. Non-STV voting systems treat all votes more equally, but have their own disadvantages.

In the following table the process of adjusting the Keep Values of all elected candidate has been continued until they each have the quota, as has the Runner-up, who has a Keep Value of one. It can then be seen how individual votes are distributed among preferences And non-transferable. The excluded candidates, A and E, are omitted.

7 Candidates for 4 Places. 7 Voting Patterns. Quota=350.0000

Cand ->		B	C	D	F	G	Non-Trn
Kp. val. ->		0.60659	0.84135	1.00000	0.58626	0.61620	1.0
Prefs.	Votes						
ABCDEFGG	123.000	74.610	40.713	7.677	-	-	-
BCDEFGA	236.000	143.154	78.115	14.730	-	-	-
CDEFGAB	189.000	-	159.014	29.986	-	-	-
DEFGABC	284.000	-	-	284.000	-	-	-
EFGABCD	179.000	17.242	9.408	1.774	104.941	45.635	-
FGABCDE	418.000	40.262	21.970	4.143	245.059	106.566	-
GABCDEF	321.000	74.732	40.779	7.690	-	197.799	-
Totals	1750.000	350.000	350.000	350.000	350.000	350.000	0.000

In the following table positive numbers show elections, and the number is the final Keep Value of the candidate, multiplied by 100. Negative numbers show exclusions, and the number is the candidate's vote at exclusion, as a percentage of the current quota. Place is an order of merit, based on final Keep Values and votes at exclusion.

R E S U L T S B Y S T A G E

Cand. ->	A	B	C	D	E	F	G
Stage							
1	..	..	..	..	..	58	..
2	..	..	..	..	..	..	61
3	-46	..	..	..	..	..	..
4	..	60	..	..	..	..	..
5	..	..	..	..	-51	..	..
6	..	..	84	RU	..	..	..
Place	7	2	4	5	6	1	3

Meek Order of merit. Elected candidates come before the gap-> FBGC DEA

B O R D A S C O R E S Borda Order of Merit-> GFAB DCE

Cand. >-	A	B	C	D	E	F	G
Score >-	7059	6961	6534	6772	6275	7451	7948
Place >-	3	4	6	5	7	2	1

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