

# DETAILED DESCRIPTION OF THE STV COUNT IN ACCORDANCE WITH THE RULES IN THE SCOTTISH LOCAL GOVERNMENT ELECTIONS ORDER 2007

**James Gilmour**

James Gilmour has been a member of the Electoral Reform Society since 1963 and served on its Council from 1975 to 1983. He has published articles on technical aspects of STV in Voting matters and has made submissions on STV election rules to the Scottish Executive and the Scottish Parliament. He recently provided advice to the Adviser to the Environment and Public Affairs Committee of the Legislative Council of Western Australia on the WIGM rules for STV elections for local government. He was an Accredited Observer at the Scottish Parliament elections and the Scottish Local Government elections in May 2007 and attended the Edinburgh Counting Centre.

24/12 East Parkside, Edinburgh EH16 5XN

e-mail: [jgilmour@globalnet.co.uk](mailto:jgilmour@globalnet.co.uk) or [jamesgilmour@f2s.com](mailto:jamesgilmour@f2s.com)

tel: 0131 667 5222    LoCall (UK only) 0845 456 1232    fax: 0870 131 9219

This is a preprint of an article submitted for consideration in  
Representation © 2007 McDougall Trust London.

Representation is available online at:

<http://www.informaworld.com/smpp/title~content=t741771152~db=all>

# DETAILED DESCRIPTION OF THE STV COUNT IN ACCORDANCE WITH THE RULES IN THE SCOTTISH LOCAL GOVERNMENT ELECTIONS ORDER 2007

*The Local Government elections in Scotland in May 2007 used the single transferable vote system of proportional representation to elect 1,222 councillors to 32 councils. The Election Rules specified the Weighted Inclusive Gregory Method for transferring surpluses. This was the first time this method had been used for public elections anywhere in the world. The votes were counted electronically, the first time this had been done for public elections on an all-Scotland basis. This paper provides a detailed description of the counting procedure in accordance with the Rules adopted in Scotland.*

## Introduction

The Local Governance (Scotland) Act 2004<sup>1</sup> makes provision for councillors in Scotland to be elected by the single transferable vote (STV) from wards returning either three or four councillors. The Act does not specify any STV counting rules but requires Scottish Ministers to make such rules by order. The Scottish Local Government Elections Order 2007<sup>2</sup> was made on 9 February 2007 and came into force on 17 February 2007 for the elections to be held on 3 May 2007. The Election Rules in this Order specified the use of the Weighted Inclusive Gregory Method (WIGM) for transferring surpluses, the first time this method had been put into practice in public elections anywhere in the world. This method involves the sorting and transferring of large numbers of ballot papers of differing values, but its adoption was considered feasible because the Order also made provision for the votes to be counted electronically.

Farrell and McAllister (2003) describe the WIGM procedure for determining the transfer value for a candidate's surplus votes as follows:

"For those votes that the candidate has received at full value,  $TV = s/v$ , where  $v$  is the candidate's total vote. For those votes that the candidate has received from another candidate's surplus,  $TV = (s/v)\beta$ , where  $\beta$  is the TV that was applied in the transfer of the surplus votes to the previous candidate." (The definitions of "TV" and "s" were given earlier in the paper: "TV" = transfer value; "s" = candidate's surplus.)

The first legislative description of WIGM was included in the Electoral Legislation Amendment Bill 2003 presented to the Legislative Assembly of the Parliament of Western Australia<sup>3</sup>. This Bill was withdrawn later in 2003 for reasons not related to the proposed change to the STV counting rules, but an identical amendment was passed in the Electoral Legislation Amendment Act 2006 with a commencement date of 5 March 2007<sup>4</sup>.

The WA legislative description introduced the term "surplus fraction" for Farrell and McAllister's calculated " $s/v$ ", which is then applied to each parcel of ballot papers with a different current value, Farrell and McAllister's " $\beta$ ", i.e. the "transfer value" at which those ballot papers were received by the candidate with the current surplus. This terminology is helpful in that it distinguishes (and names) the two steps in the process of calculating correctly weighted transfer values when a candidate has a surplus and all of that candidate's ballot papers are transferred. However, it is not good practice to effect a division before a multiplication in such a two-step calculation.

Although it obscures to some extent the principle underlying WIGM, Rule 48(3) in the Scottish Order describes the calculation with elegant simplicity and specifies the multiplication before the division:

“The vote on each ballot paper transferred under paragraph (2) shall have a value (“the transfer value”) calculated as follows—

A divided by B

Where

A = the value which is calculated by multiplying the surplus of the transferring candidate by the value of the ballot paper when received by that candidate; and

B = the total number of votes credited to that candidate,

the calculation being made to five decimal places (any remainder being ignored).”

This simple description also has the advantage of being applicable both to the transfers of surpluses of first preference votes and to the transfers of consequential surpluses, i.e. those arising at later stages.

The Election Rules do not permit the transfer of votes to already elected candidates. Such a provision would require an iterative procedure and make manual counting completely impractical. The absence of this provision does, however, create an anomaly (Newland 1985), but this anomaly has been ignored.

The Election Rules also contain some provisions that are different from those in, for example, the Gregory Method Election Rules used for STV elections in Northern Ireland<sup>5</sup>. While not essential to the WIGM procedure, these provisions are in line with the “inclusive” approach. They are included in the key features described below.

*This paper is based on a document written by the author to provide a detailed description of the STV count for the Scottish Local Government elections. That document was ‘adopted’ by the Scottish Executive and posted on the VoteScotland website<sup>6</sup> to supplement the more general public information about the STV voting system.*

### **Outline of the STV Counting Procedure**

Once the total number of valid ballot papers has been counted, the minimum number of votes a candidate needs to be elected is calculated (the “quota”).

The ballot papers are sorted according to the first preferences (first choices) marked by the voters and the total number of votes for each candidate is counted.

Any candidate whose vote equals or exceeds the quota is elected. If any candidate has more votes than the quota, that surplus above the quota is transferred in accordance with the second and later preferences recorded on all the ballot papers then held by that candidate.

If after all the surpluses have been transferred some places remain to be filled, the candidate with fewest votes is excluded and that candidate’s votes are transferred in accordance with the second and later preferences recorded on the ballot papers.

The transfers of votes continue until all the places have been filled.

### **Key Features of the 2007 Election Rules**

Votes are recorded on paper ballot papers. The criteria for ‘rejected ballot papers’ are clearly defined and such papers are not taken into the counting process.

Voters may mark as many or as few preferences as they wish. Preferences must be marked in a continuous sequence from “1”. If there is a break in the sequence, the ballot paper will become ‘non-transferable’ at the break.

The Droop ‘quota’ is specified and remains at a constant value through all stages of the count. The quota is calculated as an integer value; all other calculations are truncated at five decimal places and votes are recorded to five decimal places.

Votes are not transferred to already elected candidates.

All surpluses are transferred, in order of diminishing size, except when all places have been filled. There is no provision for deferring the transfer of any surplus, no matter how small. When a surplus is transferred all the ballot papers held by the relevant candidate are examined and transferred at proportionately weighted values by the Weighted Inclusive Gregory Method. Ballot papers with no ‘next available preference’ are set aside as ‘non-transferable’ and take with them the proportionate share of the surplus.

When an exclusion occurs, candidates are excluded one at a time; there is no provision for multiple exclusions. There are no sub-stages during the exclusion process; all ballot papers are transferred to the ‘next available preference’. When the count is conducted by electronic means, votes are transferred from excluded candidates until all places have been filled; when the count is conducted manually and only two candidates remain for the last place, the votes of the excluded candidate are not transferred.

When ties occur the most recent difference is decisive. When candidates are tied at all stages, the Returning Officer decides by lot.

Returning Officers are required to publish the votes for each candidate at each stage of the count and almost complete information about the numbers and values of ballot papers transferred at each stage of the count.

The ballot papers and other paper records must be retained securely for one year; electronic copies of the ballot papers and the electronic counting information must be retained securely for four years.

Candidates may not withdraw once nominations have closed. Casual vacancies are to be filled by a by-election within the relevant ward and the votes counted by the same rules.

*The application of the detailed Rules is illustrated by an example count for a 3-member ward in which the election was contested by 5 candidates and 2397 electors cast valid votes.*

### **Calculating the Quota**

Once the total number of valid ballot papers has been counted in each multi-member ward, the minimum number of votes a candidate needs to be elected in that ward is calculated. This number is called the “quota”. The quota in a multi-member ward is equivalent to an absolute majority in a single winner election because in a 3-member ward only 3 candidates can obtain the calculated quota of votes. Thus the three candidates who each obtain one quota of votes are the three undisputed winners.

The Election Rules prescribe the Droop Quota which is calculated as:

$$\frac{\text{total number of valid votes}}{\text{number of seats to be filled} + 1} + 1$$

If the result of the division is not an exact whole number, the remainder is ignored.

So in the example election the quota would be:

$$(2397 / (3 + 1)) + 1 = (2397 / 4) + 1 = 599 + 1 = 600 \text{ votes.}$$

### Counting the First Preferences

All the valid ballot papers are sorted according to the first preference marked on each paper and the number of votes for each candidate is counted and recorded. The specimen ballot paper in Figure 1 shows a first preference for Flora Campbell and would add one vote to her total of first preference votes.

Specimen Ballot Paper	
Jack Adams	2
Able Baker	4
Flora Campbell	1
Earl Gray	3
Windy Miller	

**FIGURE 1** Specimen ballot paper showing a voter's preferences

In the example election the numbers of first preference votes for each candidate were as shown in Table 1.

**TABLE 1** Stage 1: First preference votes

Stage 1	First Preferences
Jack Adams	550
Able Baker	377
Flora Campbell	972
Earl Gray	167
Windy Miller	331
Total	2397

Flora Campbell, with 972 votes, is elected because her total number of votes exceeds the quota of 600. Flora Campbell has a surplus of 372 votes, i.e.  $972 - 600$ , and this surplus must be transferred. If two or more candidates have surpluses, the largest surplus is transferred first. If Flora Campbell had received exactly 600 first preference votes she would have been elected, but there would be no surplus to transfer and her ballot papers would not be examined again. (Election by exact quota is very rare in real elections.)

## Transferring Surplus Votes

The Election Rules prescribe the use of the Weighted Inclusive Gregory Method (WIGM) to distribute the surplus votes. In this method **all** of the ballot papers held by the candidate with the surplus are examined. The surplus votes are transferred in accordance with the 'next available preferences' marked on those ballot papers by the voters.

The second stage of the example count is the transfer of Flora Campbell's surplus votes. All of the 972 ballot papers that were marked for Flora Campbell as first preference are now sorted according to the second preference marked on each paper. The specimen ballot paper (Figure 1) shows a second preference for Jack Adams and that paper would be transferred to Jack Adams.

If Jack Adams had also been elected at the first stage (because he had 600 or more first preference votes), that ballot paper would be transferred to Earl Gray as the 'next available preference', i.e. a candidate who has not yet been elected or excluded. Under these Rules, votes are not transferred to already elected candidates. If no candidate had been marked as second preference, that ballot paper would be set aside a 'non-transferable'.

To transfer Flora Campbell's surplus of 372 votes, all 972 ballot papers are examined and transferred, but the value of these 972 ballot papers must be reduced to ensure that only the 372 surplus votes are transferred. This is done by calculating a 'transfer value' for each ballot paper. The transfer value represents the proportion of the votes to be transferred.

The WIGM Transfer Value (TV) prescribed in the Election Rules is calculated as:

$$\frac{\text{surplus votes of elected candidate} \times \text{current value of ballot paper}}{\text{total number of votes credited to elected candidate}}$$

Transfer values are calculated to 5 decimal places and any remainder is ignored. So for Flora Campbell's 972 ballot papers, all with a current value of 1 vote, the transfer value would be:

$$\frac{372 \times 1}{972} = 0.38271$$

The numbers of ballot papers transferred to each candidate are then multiplied by this transfer value to give the numbers of votes that are to be transferred to each candidate.

In the example election, candidate Jack Adams was marked as second preference on 357 of the 972 ballot papers that had Flora Campbell as first preference. So the number of votes to be transferred to Jack Adams on those 357 ballot papers would be calculated as:  $357 \times 0.38271 = 136.62747$  votes.

The numbers of ballot papers that had second preferences for the other candidates were: Able Baker 223; Earl Gray 83; Windy Miller 252. There was no second preference marked on 57 of the ballot papers and these were set aside as non-transferable. So with each of the 972 ballot papers having a transfer value of 0.38271 votes, Flora Campbell's surplus of 372 votes would be transferred as shown in Table 2.

Because the calculation of the transfer value is truncated at five decimal places, a small fraction of a vote is not transferred, in this case 0.00588 vote. The Election Rules require the Returning Officer to publish only the numbers of non-transferable papers at each stage of the count; the Rules say nothing about the numbers of non-transferable

votes. However, a full reconciliation at each stage is not possible without this information about the non-transferable votes and the counting program provides both the numbers of non-transferable votes carried on the non-transferable papers and the fractional votes that were not transferred due to rounding (truncation at five decimal places). These are shown separately in Table 2, but only the total is shown in the stage summary (Table 3).

**TABLE 2** Stage 2: Transfer of Flora Campbell's surplus

<b>Next available preference</b>	<b>Number of papers marked with second preference</b>	<b>Number of votes to be transferred (TV = 0.38271)</b>
Jack Adams	357	136.62747
Able Baker	223	85.34433
Earl Gray	83	31.76493
Windy Miller	252	96.44292
No second preference	57	21.81447
Not transferred due to rounding	-	0.00588
<b>Total</b>	<b>972</b>	<b>372.00000</b>

The effects of all the transfers at stage 2 are shown in Table 3.

**TABLE 3** Stage 2: Candidates' votes after transfer of Flora Campbell's surplus

<b>Candidate</b>	<b>Stage 1</b> First preferences	<b>Campbell's surplus</b> Votes transferred	<b>Stage 2</b> Votes after transfer
Jack Adams	550	+136.62747	<b>686.62747</b>
Able Baker	377	+85.34433	462.34433
Flora Campbell	<b>972</b>	-372.00000	<b>600.00000</b>
Earl Gray	167	+31.76493	198.76493
Windy Miller	331	+96.44292	427.44292
Non-transferable	-	+21.82035	21.82035
<b>Total</b>	<b>2397</b>	<b>=</b>	<b>2397.00000</b>

Jack Adams' total vote now exceeds the quota (600 votes) and so Jack Adams is elected. Jack Adams has a surplus of more than 86 votes and this surplus must now be transferred as there are three 'continuing candidates' for the one place that remains to be filled.

At the third stage of the count, **all** of Jack Adams' ballot papers will be examined and transferred. These ballot papers are of two different current values:

550 ballot papers with the first preference for Jack Adams: current value = 1 vote.

357 ballot papers transferred from Flora Campbell: current value = 0.38271 vote.

The Transfer Values for these two parcels of ballot papers are calculated separately, using the formula given above. For the 550 first preference ballot papers, each with a current value of 1 vote, the transfer value will be:

$$\frac{(686.62747 - 600) \times 1}{686.62747} = 0.12616$$

For the 357 ballot papers received by transfer from Flora Campbell, each with a current value of 0.38271 vote, the transfer value will be:

$$\frac{(686.62747 - 600) \times 0.38271}{686.62747} = 0.04828$$

The ballot papers in the two parcels are sorted separately according to the next available preference marked on each paper, passing over any preference for an already elected candidate. Ballot papers on which there is no next available preference will again be set aside as 'non-transferable'.

When the ballot papers which had Jack Adams as first preference are sorted, they will be transferred to the second preference marked on each paper unless that second preference is for Flora Campbell who has already been elected. If the second preference is for Flora Campbell, the paper will be transferred to the third preference. When the ballot papers Jack Adams received from Flora Campbell at stage 2 are sorted, they will be transferred to the third preference marked on each paper. The specimen ballot paper (Figure 1), previously transferred from Flora Campbell to Jack Adams, shows a third preference for Earl Gray and that paper would be transferred to Earl Gray.

In the example election the numbers of ballot papers with preferences for each of the remaining three candidates are shown separately for each parcel of papers in Table 4, together with the numbers of votes that will be transferred. This table again includes both the non-transferable votes carried by the non-transferable ballot papers and the vote fractions not transferred due to truncation in the calculation of the transfer values.

**TABLE 4** Stage 3: Transfer of Jack Adams' surplus

Parcel of Ballot Papers	Papers with Jack Adams as first preference (550)		Papers transferred from Flora Campbell (357)		Total Votes to be transferred
	Number of papers with next preference	Votes to be transferred TV = 0.12616	Number of papers with next preference	Votes to be transferred TV = 0.04828	
Able Baker	35	4.41560	7	0.33796	4.75356
Earl Gray	400	50.46400	49	2.36572	52.82972
Windy Miller	78	9.84048	263	12.69764	22.53812
No further preference	37	4.66792	38	1.83464	6.50256
Not transferred due to rounding	-	0.00204	-	0.00147	0.00351
<b>Total</b>	<b>550</b>	<b>69.51620</b>	<b>357</b>	<b>17.28571</b>	<b>86.62747</b>



The effects of these transfers at stage 3 are shown in Table 5.

**TABLE 5** Stage 3: Candidates' votes after transfer of Jack Adams' surplus

	<b>Stage 1</b>	<b>Campbell's surplus</b>	<b>Stage 2</b>	<b>Adams' surplus</b>	<b>Stage 3</b>
<b>Candidate</b>	First preferences	Votes transferred	Votes after transfer	Votes transferred	Votes after transfer
Jack Adams	550	+136.62747	<b>686.62747</b>	-86.62747	<b>600.00000</b>
Able Baker	377	+85.34433	462.34433	+4.75356	467.09789
Flora Campbell	<b>972</b>	-372.00000	<b>600.00000</b>		<b>600.00000</b>
Earl Gray	167	+31.76493	198.76493	+52.82972	251.59465
Windy Miller	331	+96.44292	427.44292	+22.53812	449.98104
Non-transferable	-	+21.82035	21.82035	+6.50607	28.32642
<b>Total</b>	2397	=	2397.00000	=	2397.00000

Jack Adams' surplus has been transferred, but it has not brought the vote of any other candidate up to the quota. Thus one place remains to be filled. So the next stage must be to exclude the candidate with the smallest number of votes, in this case, Earl Gray who has 251.59465 votes.

### Excluding a Candidate

When a candidate is excluded, all of that candidate's ballot papers are examined and transferred to the next available preference marked on each paper. Each ballot paper is transferred at its current value.

The candidate who is to be excluded in the example election, Earl Gray, has ballot papers of four different values:

167 ballot papers with the first preference for Earl Gray:

current value of each paper = 1 vote.

83 ballot papers transferred from Flora Campbell:

current value of each paper = 0.38271 vote.

400 ballot papers transferred from Jack Adams:

current value of each paper = 0.12616 vote.

49 ballot papers transferred from Jack Adams after transfer from Flora Campbell:

current value of each paper = 0.04828 vote.

The ballot papers in each of these four parcels are sorted separately according to the next available preference marked on each paper, again passing over any preference for an already elected candidate. This means that the ballot papers can be transferred only to Able Baker or Windy Miller. Ballot papers on which there is no next available preference will be set aside as 'non-transferable'.

The specimen ballot paper (Figure 1) would be in the fourth parcel of 49 papers because it had previously been transferred from Flora Campbell (first preference) to Jack Adams (second preference) and then from Jack Adams to Earl Gray (third preference). That paper would now be transferred to Able Baker (fourth preference) and add 0.04828 vote to Able Baker's total vote.

In the example election the numbers of ballot papers with preferences for the remaining two candidates are shown separately for each parcel of papers in Table 6, together with the numbers of votes that will be transferred. The effects of these transfers are shown in the Final Result table (Table 7). The transfer of 152.79922 votes to Windy Miller brought his total vote to more than 602 votes. This exceeds the quota and so Windy Miller takes the last of the three places.

### **Filling the Last Places**

If at any stage during the count, the number of 'continuing candidates', i.e. those not elected and not excluded, is equal to the number of places remaining to be filled, those candidates are elected. In this event, no further transfers of ballot papers and votes are made, even if the last elected candidates have not attained the quota.

### **Provision for Tied Votes**

When a surplus has to be transferred or a candidate has to be excluded, two candidates sometimes have exactly the same number of votes. If this happens, the Returning Officer will look back through the count for the most recent stage at which there was a difference between the votes of the two candidates. If a difference is found at an earlier stage, the candidate with the higher number of votes (in the case of a surplus transfer) or the lower number of votes (in the case of an exclusion) will have their ballot papers transferred first. If there was no difference at any stage, the Returning Officer will determine by lot which surplus to transfer or which candidate to exclude. In an electronic count, the process is halted for manual intervention by the Returning Officer after casting the lot.

**TABLE 6** Stage 4: Transfer of Earl Gray's votes on exclusion

Parcel of Ballot Papers	Earl Gray first preference		Transferred from Flora Campbell		Transferred from Jack Adams		Transferred from Jack Adams after transfer from Flora Campbell		Total Votes to be transferred
Next available preference	Number of papers with next preference	Votes to be transferred TV = 1.00000	Number of papers with next preference	Votes to be transferred TV = 0.38271	Number of papers with next preference	Votes to be transferred TV = 0.12616	Number of papers with next preference	Votes to be transferred TV = 0.04828	
Able Baker	54	54.00000	15	5.74065	84	10.59744	7	0.33796	70.67605
Windy Miller	96	96.00000	58	22.19718	267	33.68472	19	0.91732	152.79922
No further preference	17	17.00000	10	3.82710	49	6.18184	23	1.11044	28.11938
<b>Total</b>	167	167.00000	83	31.76493	400	50.46400	49	2.36572	251.59465

**TABLE 7** Stage 4: Final Result

Total valid vote = 2397      Number to be elected = 3      Quota = 600

	Stage 1	Campbell's surplus	Stage 2	Adams' surplus	Stage 3	Gray's exclusion	Stage 4	
Candidate	First preferences	Votes transferred	Votes after transfer	Votes transferred	Votes after transfer	Votes transferred	Votes after transfer	
Jack Adams	550	+136.62747	<b>686.62747</b>	-86.62747	<b>600.00000</b>		<b>600.00000</b>	<b>Elected</b>
Able Baker	377	+85.34433	462.34433	+4.75356	467.09789	+70.67605	537.77394	
Flora Campbell	<b>972</b>	-372.00000	<b>600.00000</b>		<b>600.00000</b>		<b>600.00000</b>	<b>Elected</b>
Earl Gray	167	+31.76493	198.76493	+52.82972	251.59465	-251.59465	0.00000	
Windy Miller	331	+96.44292	427.44292	+22.53812	449.98104	+152.79922	<b>602.78026</b>	<b>Elected</b>
Non- transferable	-	+21.82035	21.82035	+6.50607	28.32642	+28.11938	56.44580	
<b>Total</b>	2397	=	2397.00000	=	2397.00000	=	2397.00000	

## Evaluation of the Counting Program

The contractors appointed to undertake the electronic counting, DRS Data Services Ltd and Electoral Reform Services Ltd, used the eSTV computer program<sup>7</sup> to perform the STV counts. This program was tested for compliance with the Election Rules by LaQuSo, the Laboratory for Quality Software at Radboud University Nijmegen. The LaQuSo report has not been formally published by the Scottish Executive, but is freely available; a copy has been posted on the Voting matters Resources webpage<sup>8</sup>.

The testers raised several issues that would be completely irrelevant to the use of the eSTV program in elections held under the Rules in the Order, e.g. those relating to withdrawal of candidates, "invalid" ballot papers and blank ballot papers. Candidates cannot withdraw once nominations have closed, but if a death occurs in a contested election before the result has been declared, that election will be void and a by-election for all the seats in the affected ward will be held within 35 days. Blank ballot papers and the various "invalid" ballot papers would be rejected during the adjudication process and never submitted to the counting program.

The testers encountered a problem with the precision of the calculation of transfer values because the precision is not stated explicitly in the Election Rules (see Rule 48(3) above). The intended precision is, however, clear to those familiar with the conventions of UK legislation, namely that any paragraph is subject to those preceding it and that any actions should be carried out in the order stated. Thus Rule 48(3) provides for a first five-decimal-place number to be multiplied by a second five-decimal-place number, yielding an intermediate result with ten decimal places which is then to be divided by a third five-decimal-place number and the result of that division to be truncated at five decimal places. It would, however, have been better if the precision had been stated explicitly in the Rules.

The testers also drew attention to an issue relating to the processing of ballot papers with all preferences marked and those with all but one preference marked that can arise as a consequence of the requirement, in an electronic count, to continue transferring votes from excluded candidates until all places have been filled. Thus when there are only two continuing candidates for the last place, a ballot paper with all preferences marked, the excluded candidate marked as the penultimate preference and the other candidate marked as the ultimate preference, would be transferred to the eventual winner. If, however, the ballot paper had no preference marked against the latter candidate (as in Figure 1), it would become non-transferable. This difference in the treatment of the two ballot papers in an electronic count has no effect on the outcome of the election, but it does have implications for the way preference voting is explained to electors. This last place transfer would never happen in a manual count under the Rules and so these two ballot papers would be treated identically, i.e. the ballot papers could never be transferred to any candidate the voter had placed after all other candidates no matter whether the voter had indicated that by marking the last preference or leaving the last preference blank. The requirement to continue transferring votes when there two continuing candidates and only one place remains to be filled is unnecessary and its effects are undesirable; it should therefore be removed from any future version of these Rules.

## Publication of Results

With the exception of the numbers of non-transferable votes, the Election Rules require the Returning Officers to publish all the results from the STV count, including the numbers of ballot papers transferred and their transfer values at each stage of the count. The eSTV program produces very comprehensive output, including the numbers of non-transferable votes and the vote fractions not transferred due to rounding. Several Returning Officers had, within one week of the elections, published all this information on the relevant council's website. Some have provided the complete eSTV output for each ward in a downloadable, zipped folder<sup>9</sup>. Others have provided a more structured approach<sup>10, 11</sup>. Yet others have provided a front page summary for each ward supplemented by a spreadsheet that integrates the detailed eSTV output in a comprehensive and comprehensible format<sup>12</sup>.

## Postscript

The elections to the Scottish Parliament were held on the same day as the local government elections, as in 2003. These elections use a regionalised version of the Additional Member System (AMS), which is also known as Mixed Member Proportional (MMP). For the 2007 elections the two AMS "X" votes were recorded on one ballot sheet (in place of the previously used two separate ballot papers) and the votes were counted electronically. The unusually high levels of rejected ballot papers in these elections attracted a great deal of media coverage and, to a large extent, overshadowed any assessment of the use of STV in public elections which was a new experience for the current generation of electors in Scotland. (STV was used to elect the Scottish Education Authorities in four elections in the 1920s.)

The levels of rejected ballot papers in the Local Government STV elections were much lower than in the Scottish Parliament AMS elections<sup>13</sup>. The average percentage of rejected STV ballot papers for the whole of Scotland was 1.85%, ranging from 1.1% in East Dunbartonshire to 2.8% in West Dunbartonshire. The rejection rate was below 2.0% in 19 of the 32 Local Government Areas. In contrast, in the Scottish Parliament elections, the all-Scotland averages for rejected regional ballot papers and rejected constituency ballot papers were 2.9% and 4.1% respectively. The highest rates of rejection of AMS ballot papers occurred in the Glasgow Electoral Region, at 4.2% and 7.9% respectively. Nine of the ten constituencies within the Glasgow Electoral Region cover almost the same electorate as the Glasgow City Council area. The boundaries of the Scottish Parliamentary constituencies and the local government electoral wards are not coterminous, but the data for the council wards have been reworked to allocate valid votes and rejected ballot papers to the nine constituencies in proportion to geographical areas. On this basis, the averages of rejected ballot papers for the regional, constituency and council votes were 4.3%, 8.1% and 2.3% respectively. The Glasgow Shettleston constituency had the highest percentage of rejected constituency ballot papers in the whole of Scotland, at 12.1%. In contrast, the average for the rejected STV ballot papers proportioned from the three wards that cover the same area was only 2.9% (2.1%, 2.6% and 4.0% in the three individual wards). In the 22 wards of the Highland Council area, the average for rejected STV ballot papers was 1.7%, ranging from 1.1% to 2.8%, compared with 2.6% and 3.4% for the two Scottish Parliament votes in the constituencies covering the same electors. Most rejections of the STV ballot papers occurred because the voters had marked their chosen candidates with two or more Xs. Experience from

Northern Ireland shows that this error is more common when STV elections are held on the same day as elections in which voters mark another ballot paper with one or more Xs.

No detailed analysis of the results has been possible at the time of writing, but the preliminary indications are that voters understood how to use their votes in the STV elections and made effective use of their preferences. For example, in the Glasgow wards (five 3-member, sixteen 4-member) the numbers of candidates ranged from 8 to 13. In every ward some voters (minimum 2.7%) marked every preference; in the two wards with 8 candidates, 10.3% marked all 8 preferences; over all 21 wards, 7.2% of voters marked 8 or more preferences. Overall, 76.1% of voters marked two or more preferences, 57.1% marked three or more, 28.5% marked four or more and 13.4% marked five or more preferences.

## NOTES

1. The Local Governance (Scotland) Act 2004, available online at:  
<http://www.opsi.gov.uk/legislation/scotland/acts2004/20040009.htm>
2. The Scottish Local Government Elections Order 2007, available online at:  
<http://www.opsi.gov.uk/legislation/scotland/ssi2007/20070042.htm>
3. Western Australia: Electoral Legislation Amendment Bill 2003. Section 39, available online at  
[www.parliament.wa.gov.au/parliament/bills.nsf/D01772C4B422B78F48256DCE00088CCB/\\$File/Bill243-1.pdf](http://www.parliament.wa.gov.au/parliament/bills.nsf/D01772C4B422B78F48256DCE00088CCB/$File/Bill243-1.pdf)
4. The amended text of Schedule 1 “Counting of votes at Legislative Council elections” of the Western Australia Electoral Act 1907 is available online at:  
<http://www.slp.wa.gov.au/statutes/swans.nsf/be0189448e381736482567bd0008c67c/6982cde32dcfa279c825729200202632?OpenDocument>
5. The Local Elections (Northern Ireland) Order 1985. Statutory Instrument 1985 No. 454.
6. VoteScotland website: <http://www.votescotland.com>
7. eSTV available online at: <http://www.electoral-reform.org.uk/article.php?id=115>
8. LaQuSo 2007. *Testing the eSTV program for the Scottish Local Government Elections*. Nijmegen: Radboud University Nijmegen; available online at:  
<http://www.mcdougall.org.uk/VM/RESOURCE.HTM>
9. Glasgow City Council:  
[http://www.glasgow.gov.uk/en/YourCouncil/Elections\\_Voting/Election\\_Results/ElectionScotland2007/LGElectionResults.htm](http://www.glasgow.gov.uk/en/YourCouncil/Elections_Voting/Election_Results/ElectionScotland2007/LGElectionResults.htm)
10. Edinburgh City Council:  
[http://www.edinburgh.gov.uk/internet/Council/Elections/Elections\\_2007\\_\(hidden\)/Results/results\\_May\\_2007/CEC\\_election\\_results\\_2007](http://www.edinburgh.gov.uk/internet/Council/Elections/Elections_2007_(hidden)/Results/results_May_2007/CEC_election_results_2007)
11. West Lothian Council:  
<http://coins.westlothian.gov.uk/coins/electionresults/index.htm>
12. Falkirk Council:  
[http://www.falkirk.gov.uk/services/corporate\\_commercial/policy\\_performance\\_review/research\\_information/election\\_results/local\\_results/2007.aspx](http://www.falkirk.gov.uk/services/corporate_commercial/policy_performance_review/research_information/election_results/local_results/2007.aspx)
13. Electoral Commission: Rejected ballot papers at the 3 May Scottish elections  
[http://www.electoralcommission.org.uk/files/dms/Rejectedballotpapersatthe3MayScottishelections\\_26507-19604\\_S\\_.pdf](http://www.electoralcommission.org.uk/files/dms/Rejectedballotpapersatthe3MayScottishelections_26507-19604_S_.pdf)

## REFERENCES

- FARRELL, DAVID. M. and MCALLISTER, IAN. 2003. The 1983 Change in Surplus Vote Transfer Procedures for the Australian Senate and its Consequences for the Single Transferable Vote. *Australian Journal of Political Science*, Vol. 38, 479–491, available online at  
[http://www.citizensassembly.bc.ca/resources/Farrell\\_McAllister\\_1983\\_Surplus\\_Change.pdf](http://www.citizensassembly.bc.ca/resources/Farrell_McAllister_1983_Surplus_Change.pdf)
- NEWLAND, ROBERT A.. 1985. Consequential Surplus: Transfer of the Last Parcel. *Representation*, 25: 18-19.