

# Cambridge's Single Transferable Vote (STV)



## Getting Into the Weeds

Celeste Landry -- Dec 5, 2017

# Overview of the Weeds

- How Cambridge came to adopt STV
- Factors that contribute to its continued usage
- Contrast with local CO elections in Colorado
- Nuts and bolts – Tallying a real election
- Personal observations

# 2017 VOTING METHODS Position

## LWV of Colorado

*The League supports authorizing and implementing **alternatives to plurality voting** that allow people to express their preferences more effectively. The League supports gaining on-the-ground experience with alternative voting methods in order to ascertain whether a voting method results in outcomes that match voters' preferences as recorded on their ballots. The League supports voting methods that can improve the election experience, that encourage honest\* voting rather than tactical\* voting, and that consider ease of implementation.*

### *Considerations:*

- **Some voting methods are intended for single-winner elections, others for multi-winner elections.** *It is important that the intended use of a voting method match its actual application. Multi-winner voting methods can promote **proportional representation** which fosters diversity of our elected officials.*
- *Election officials should conduct post-election analysis to evaluate the voters' usage of the voting method and the election's reflection of voters' stated preferences. There should be sufficient data transparency – for example, access to ballot records in anonymous form – for an independent analysis to be conducted by other interested groups.*

*\*A voting method encourages "honest" voting when it allows voters to meaningfully support all their preferred candidates, rather than leading them to either not support their favorite or "tactically" indicate a higher preference for a candidate who is not their favorite.*

# Plurality Voting Method

## Single-winner

*Vote for one*

- chocolate cake
- brownie
- lemon cake
- truffle

**Voting different**

**Tallying identical**

## Multi-winner

*Vote for (up to) three*

- chocolate cake
- brownie
- lemon cake
- truffle
- banana split
- crème brûlée
- Rice Crispies® treat
- chocolate mousse

# Ranking Voting Method

## Single-winner (inc. IRV)

*Rank in order of preference.*

*One (1) to be elected.*

\_\_\_ chocolate cake  
\_\_\_ brownie  
\_\_\_ lemon cake  
\_\_\_ truffle

**Voting identical**

**Tallying different**

## Multi-winner (inc. STV)

*Rank in order of preference.*

*Three (3) to be elected.*

\_\_\_ chocolate cake  
\_\_\_ brownie  
\_\_\_ lemon cake  
\_\_\_ truffle  
\_\_\_ banana split  
\_\_\_ crème brûlée  
\_\_\_ Rice Crispies® treat  
\_\_\_ chocolate mousse

# *Bucklin voting (aka Grand Junction method):*

Voters rank candidates.

Promoted by James Bucklin of Grand Junction, Colorado

Bucklin's multi-winner version does NOT promote proportional representation.

Dates of implementation in CO:

1911 – Pueblo

1913 – Denver, CO Springs, and Fort Collins

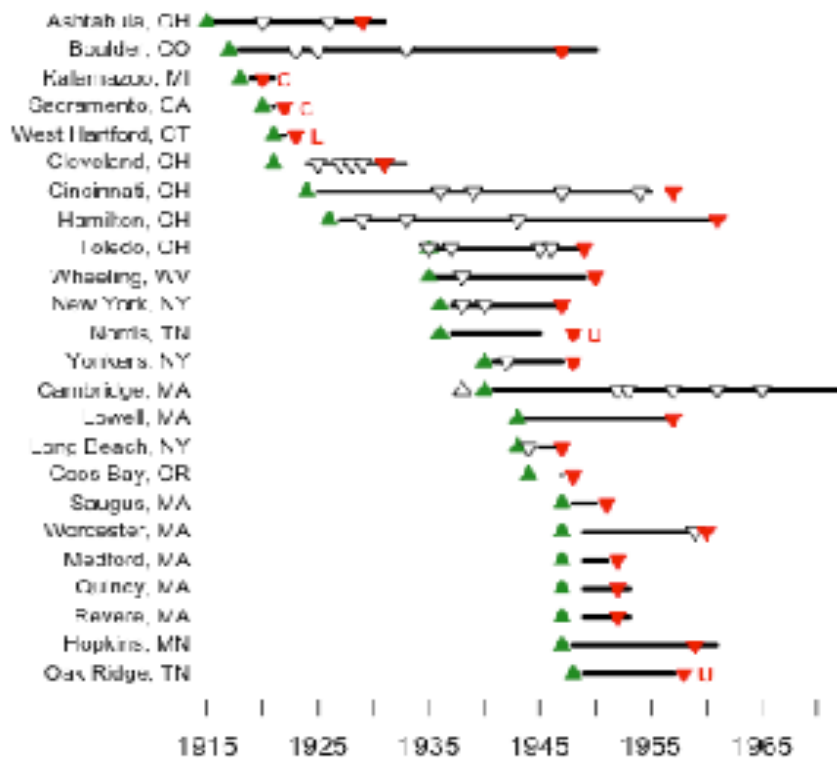
19?? – Grand Junction

Sources: Center for Election Science -- [electology.org](http://electology.org),  
Opa Vote -- <https://www.opavote.com/methods/other>

# History of STV in the US

Chart by Jack Santucci, jacksantucci.com, 2017 PhD, Georgetown University

## Use of proportional representation (STV) in US cities



Empty triangles: failed adoption (upward) or repeal referenda (downward).

All but New York City included PR in council-manager charters.

Non-referendum repeal methods: C=unconst. by court, L=state legislature, U=unknown.

# Massachusetts Plan E

Cambridge, MA



1938 – Vote for a better, more proportionally representative way to elect officials. **(Failed)**

1940 – Replace the (corrupt) “strong mayor” system with a “strong city manager – weak mayor” system. **(Succeeded)**



# Cambridge's STV Elections

## **City Council** – elect 9 members

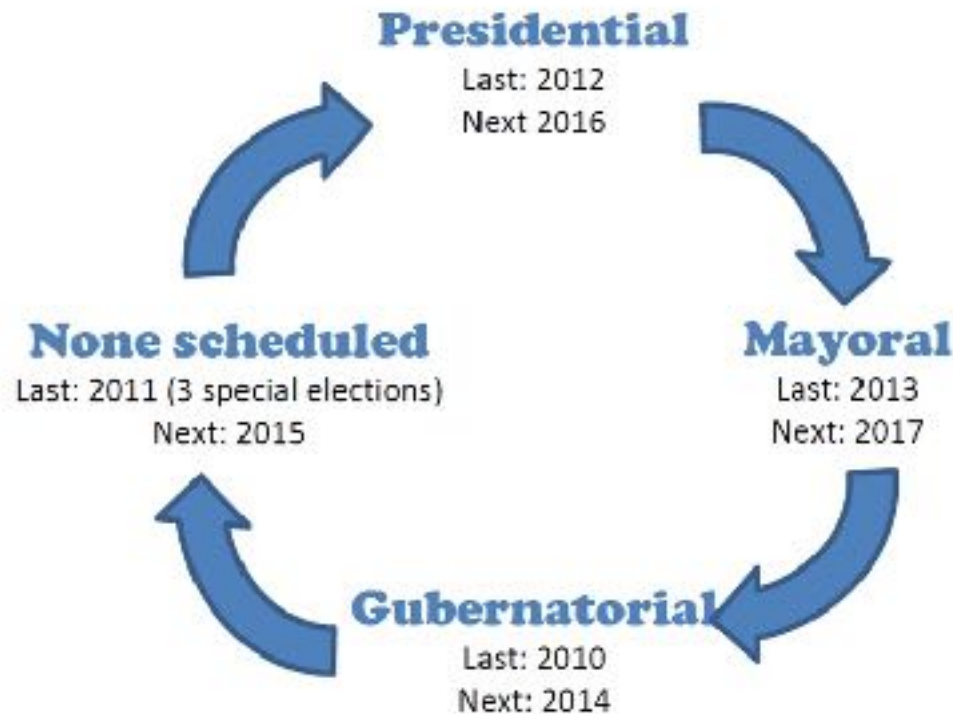
The city council chooses one of their members to be the city mayor.

## **School Committee** – elect 6 members

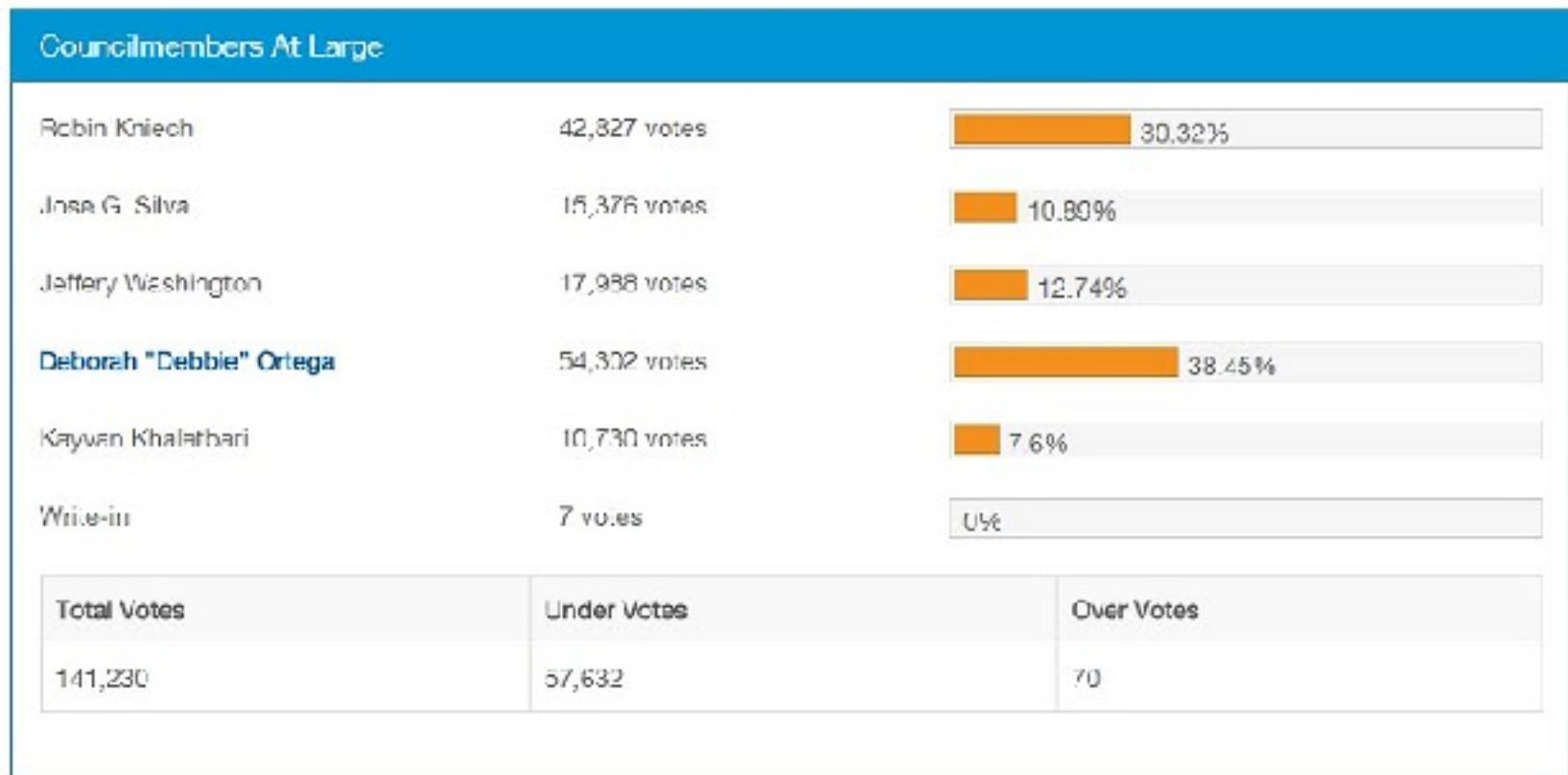
The mayor is the 7<sup>th</sup> member of the school cmte.

# Minneapolis 4-yr Election Cycle

from “The 2013 Municipal Elections: An Analysis & Recommendations”



# 2015 Councilmember At Large (2 elected) - Denver



# Why study Cambridge's 9-winner and 6-winner elections?

1) Other multi-winner elections in Colorado with more than 2 or 3 winners.

City councils: Boulder, Lafayette, Telluride, etc.

2) Move toward proportional representation with large multi-winner districts rather than geographical (ward) representation.

Denver – 13 council members

Fair Representation Act

# STV → End of gerrymandering?



Elbridge Gerry  
(1744 – 1814)

STV is a type of voting method which promotes **proportional representation.**

Therefore, STV used in “large” districts to elect multiple representatives reduces or eliminates gerrymandering.

# Why is Single Transferable Vote successful in Cambridge?

**Repetition** – STV election every odd year

**Single method** – STV for both (all) races

**Tallying** – separate ballot for each race,  
now computerized tallying

# 1979 Cambridge Ballots

DIRECTIONS TO VOTERS	
DO NOT USE X MARKS.	
Mark your choices with NUMBERS only.	
Put the figure 1 opposite your first choice, the figure 2 opposite your second choice, the figure 3 opposite your third choice, and so on. You may mark as many choices as you please.	
Do not put the same figure opposite more than one name. If you spoil this ballot, return it for cancellation to the election officer in charge of the ballots and get another from him.	
CITY COUNCILLORS For Term of Two Years	
AGEE, DAVID HERR, 28 Harbut St.	
BENTUBO, RICHARD A., 3 Austin Park	
CARAGIANES, CHARLES J., 4 William St.	
CLINTON, DANIEL J., 31 Rockingham St.	
CRANE, KEVIN P., 16 Alberta Terrace	CANDIDATE FOR SELECTION
DANEHY, THOMAS W., 19 Richard Ave.	CANDIDATE FOR SELECTION
DUEHAY, FRANCIS H., 26 Lowell St.	CANDIDATE FOR SELECTION
FRISOLI, LAWRENCE W., 4 Avon St.	CANDIDATE FOR SELECTION
GRAHAM, SAUNDRA, 189 Western Ave.	CANDIDATE FOR SELECTION
HUNT, DONALD J., 61 Garfield St.	
JONES, WILLIAM C., 160 Norfolk St.	
LaTREMOUTILLE, ROBERT J., 4 Trowbridge Place	
McGURK, JAMES L., 101 Auburn St.	
OKUN, DOUGLAS R., 334 Welden St.	
DIRECTIONS TO VOTERS	
DO NOT USE X MARKS.	
Mark your choices with NUMBERS only.	
Put the figure 1 opposite your first choice, the figure 2 opposite your second choice, the figure 3 opposite your third choice, and so on. You may mark as many choices as you please.	
Do not put the same figure opposite more than one name. If you spoil this ballot, return it for cancellation to the election officer in charge of the ballots and get another from him.	
SCHOOL COMMITTEE For Term of Two Years	
ATTLES, HENRIETTA S., 39 Bishop Allen Drive	
BERMAN, SARA MAE, 23 Fayette St.	CANDIDATE FOR SELECTION
BLACKMAN, DAVID C., 129 Fayerweather St.	
CARROLL, ROBERT A., 5 Elsworth Park	
FANTINI, DONALD A., 15 Day St.	CANDIDATE FOR SELECTION
FITZGERALD, JAMES F., 137 Ohio St.	
HOLWAY, DAVID JEFFREY, 20 Norwichtown St.	CANDIDATE FOR SELECTION
KENNEDY, DAVID P., 63 Sixth St.	
KOCHER, GLENN STEPHEN, 43 Lee St.	CANDIDATE FOR SELECTION
MAYNARD, JOSEPH E., 214 1/2 Harvard St.	CANDIDATE FOR SELECTION
RAGNO, NICHOLAS R., 74 Gore St.	
WOLF, ALICE K., 48 Huron Ave.	CANDIDATE FOR SELECTION

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**Single method** – STV for both (all) races

**Tallying** – separate ballot for each race,  
now computerized tallying


**Voters' voice** – rankings = # of candidates






# 2017 Optical Scan Ballot

## CANDIDATES FOR CITY COUNCIL

for Term of Two Years  
**Instructions to  
Voters**

Mark your choices by completely  
filling in the numbered ovals like  
this  using a black pen.

- Fill in the number one  oval next  
to your first choice.
- Fill in the number two  oval next  
to your second choice.
- Fill in the number three  oval next  
to your third choice, and so on.
- You may fill in as many choices as  
you please.
- Fill in no more than one oval per  
candidate.
- Fill in no more than one oval per  
column.

To vote for a write-in candidate:

- Fill in a numbered oval next to the  
name you have written, showing  
your choice as a number for a  
candidate.
- Record write-ins from the top line  
down.

If you spoil this ballot, return it for  
cancellation to the election officer in  
charge of the ballots and get another  
from such officer.

Only one vote per candidate. Only one vote per column.

DO NOT USE RED TO MARK BALLOT

RONALD BENJAMIN, 121 Oaking Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
JOSH M. BURGIN, 670 Memorial Drive	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
DENNIS J. CARLONE, 5 Webster Avenue	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
CLIMA D'AMBROSIO, 3 Arlington Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
JAM CRIVELLO, 7001 Channing Avenue	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
SAMUEL GEBRU, 512 Marston Drive	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
RICHARD HARDING, JR., 130 Windsor Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
GRACIE KELLEY, 65 East Grand Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
DAN LENKE, 148 Rindge Avenue	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
ILAN LEVY, 148 Spring Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
ALANNA N. MALLON, 21 Maple Avenue	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
MARC C. MCGOVERN, 15 Beacon Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
GREGG J. MORRIS, 25 Fairfield Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
ADRIANNE B. MURPHY, 2 Newell Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
NADIA T. OKAMOTO, 701 Hooker Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
HARIL PILLAI, 122 Cambridge Park Dr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
JEFF SANTOS, 500 3rd Street	1	2	3	4	5	6	7	8	9	1																																																																																										

# Why is Single Transferable Vote successful in Cambridge?

**Repetition** – STV election every odd year

**Single method** – STV for both (all) races

**Tallying** – separate ballot for each race,  
now computerized tallying

**Voters' voice** – rankings = # of candidates

**Sales pitch** – proportional representation

# 2017 City Council Election with Proportional Representation

4 women, 5 men elected

2 candidates won in the 1<sup>st</sup> round: the mayor  
(African-American lesbian) and a female  
Muslim lawyer

If you have #1 votes from 1/10 of the  
electorate, you can get elected.

All incumbents got re-elected.

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**Data/Pride** – Robert Winters' website

# Cambridge Factors that Concern ELECTION ADMINISTRATORS

**In-person voting on Election Day** is standard.

# Vote at Polls on Election Day

**REGISTER and VOTE**  
**CAMBRIDGE MUNICIPAL ELECTION**  
**TUESDAY, NOVEMBER 7<sup>th</sup>**  
**POLLS OPEN 7<sup>am</sup> to 8<sup>pm</sup>**  
**DEADLINE TO REGISTER**  
**WEDNESDAY, OCTOBER 18<sup>th</sup>, 8:00<sup>pm</sup>**  
FOR MORE INFORMATION:  
CONTACT CAMBRIDGE ELECTION COMMISSION  
51 INMAN STREET, CAMBRIDGE, MASS. TEL: (617) 349-4361  
[www.cambridgema.gov/election](http://www.cambridgema.gov/election)

**Mayor: E. Denise Simmons**

**CAMBRIDGE CITY HALL & MUNICIPAL BUILDINGS**  
HOURS of OPERATION: Monday 8:30am-8:00pm • Tuesday-Thursday 8:30am-5:00pm • Friday 8:30am-12:00 (Noon)

# Cambridge Factors that Concern ELECTION ADMINISTRATORS

**In-person voting on Election Day** is standard.

**Incumbency status** is noted on the ballots.

**Rotate candidate names** on the ballots.

No need to pre-file as a **write-in candidate**.

# 2017 Ballot Detail

Note: write-in candidates and name rotation

PAUL F. TONER, 24 Newman Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
TIMOTHY J. TOOMEY, JR., 88 6th Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CANDIDATE FOR RE-ELECTION																		
GWEN THOMAS VOLMAR, 13 Ware Street	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
QUINTON Y. ZONDERVAN, 235 Cardinal Medeiros Ave.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WRITE-IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

By law, candidates' names are rotated on ballots at polls, and may appear in a different order than on this Specimen ballot.



# Cambridge Factors that Concern CANDIDATES

All terms are **two years** long

Substantial **salary** for elected officials

\$80K for city council

\$40K for school cmte

History of **slate endorsements**

# Sample 2017 City Council Slate

**Vote for all 5 in order of your preference.**



Dennis Carlone, Sumbul Siddiqui, Vatsady Sivongxay, Jan Devereux,  
Quinton Zondervan (from L to R)

**Cambridge Residents Alliance** [http://  
www.cambridgeresidentsalliance.org/](http://www.cambridgeresidentsalliance.org/)

# Campaign Sign -- Siddiqui



# Campaign Sign – Incumbent Simmons



# Campaign Sign – MacArthur



# Nuts and Bolts of Cambridge STV

<http://rwinters.com/elections/supplement.htm>

- Droop Quota  $\approx 1/(\text{\# of seats} + 1)$  of the votes  $\rightarrow$  Round up
- **Cincinnati Method** to transfer surplus votes when a candidate surpasses the quota
  - requires a ballot order  $\rightarrow$  Random Draw of Precincts
  - votes never transfer to a winner
- Under 50 votes  $\rightarrow$  simultaneous elimination
- Tiebreaker
- Filling a later vacancy

# Modern Fractional Vote Transfers vs Cincinnati Method

Modern implementations of STV with software allow for a fractional transfer of votes so that if the voter's 1<sup>st</sup>-choice candidate surpasses the quota, then a fraction of each vote for that candidate stays with the candidate and the remaining fraction of the unitary vote goes to the next eligible candidate on the ballot.

Cincinnati Method transfers only whole votes, no fractional votes. Counting by hand, you could move the entire ballot to another candidate's pile.

# Comparing Vote Transfers

## Fractional Vote Transfers

1. lemon cake (eliminated)
2. chocolate cake (winner)
- 3 brownie
- 4 truffle

- Part of unitary vote to chocolate cake and rest of vote goes to brownie

## Cincinnati Method

1. lemon cake (eliminated)
2. chocolate cake (winner)
- 3 brownie
- 4 truffle

- Single vote is transferred to brownie



# Mpls Board of Estimate and Taxation 2009 – Elect 2 members

Candidate	Round 1	Round 2	Round 2	Round 3	Round 3	Round 4	Round 4	Round 5	Round 5	Final Round Percentage
		Distributed surplus: Becker		Defeated Swartwood and Write-in		Defeated Martens		Defeated Townsend and Wilkie		
	First preference votes	Vote Change (+ Added, - Subtracted)	Grand Total	Vote Change (+ Added - Subtracted)	Grand Total	Vote Change (+ Added - Subtracted)	Grand Total	Vote Change (+ Added - Subtracted)	Grand Total	May not sum to 100% due to rounding
Becker	16728	-6030.4440	10697.5560	0.0000	10697.5560	0.0000	10697.5560	0.0000	10697.5560	33.34%
Martens	2778	342.8355	3120.8355	152.5955	3273.4310	-3273.4310	0.0000	0.0000	0.0000	0.00%
Swartwood	975	185.6575	1160.6575	-1160.6575	0.0000	0.0000	0.0000	0.0000	0.0000	0.00%
Townsend	2323	908.4600	3231.4600	133.0375	3364.4975	309.5765	3674.0740	0.0000	3674.0740	11.45%
Wheeler	6107	1132.6910	7239.6910	250.3665	7490.0575	617.3695	8107.4270	0.0000	8107.4270	25.27%
Willkie	2950	577.1605	3527.1605	205.2475	3732.4080	366.0280	4098.4360	0.0000	4098.4360	12.77%
Write-in	225	16.5830	241.5830	-241.5830	0.0000	0.0000	0.0000	0.0000	0.0000	0.00%
Exhausted	-	2867.0565	2867.0565	660.9935	3528.0500	1980.4570	5508.5070	0.0000	5508.5070	17.17%
TOTAL	32086		32086.0000		32086.0000		32086.0000		32086.0000	

# 2017 Computer Glitch

For first time in 15 years, a few of the 128KB memory cards didn't upload. It took 1 ½ hours to rescan ballots with different memory cards.

Cambridge uses 21-year-old voting machines. New machines are scheduled for the 2018 election.

# 2017 School Committee 1<sup>st</sup> Count

Count #1 votes.

To get quota,  
divide 20,708 votes by 7.

Result = 2958.3

Round up to next integer.

Quota is 2959 votes.

Final Official	1st
Candidate	Count
Nolan, Patricia M.	3458
Bowman, Manikka L.	2768
Fantini, Alfred B.	2728
Dexter, Emily R.	2378
Kelly, Kathleen M.	1882
Kimbrough, Laurance V.	1858
Cronin, Fran Albin	1572
Crutchfield, Jake W.	1039
Kadete, Elechi M.	848
Weinstein, David J.	797
MacArthur, Will	795
Mitros, Piotr Flawiusz	511
Write-Ins	78
Exhausted	0
Total valid ballots	20708
Quota = 2959	
Invalid ballots	1744
Total ballots	22452

# 2017 School Committee 2<sup>nd</sup> Count

Choose 499 ballots for Nolan according to the Random Draw of Precincts and transfer those votes to the #2 choice.

Final Official	1st	Nolan surplus	
Candidate	Count	2nd	Count
Nolan, Patricia M.	3458	-499	2959
Bowman, Manikka L.	2768	109	2877
Fantini, Alfred B.	2728	38	2766
Dexter, Emily R.	2378	95	2473
Kelly, Kathleen M.	1882	85	1967
Kimbrough, Laurance V.	1856	24	1880
Cronin, Fran Albin	1572	52	1624
Crutchfield, Jake W.	1039	19	1058
Kadete, Elechi M.	846	18	864
Weinstein, David J.	797	30	827
MacArthur, Will	795	12	807
Mitros, Piotr Flawiusz	511	17	528
Write-Ins	78	0	78
Exhausted	0	0	0
Total valid ballots	20708	0	20708
Quota = 2959			
Invalid ballots	1744		
Total ballots	22452		

# 2017 School Committee 3<sup>rd</sup> Count

Transfer votes for candidates with fewer than 50 votes to the next choice on the ballot.

Lots of exhausted ballots.

Final Official	1st	Nolan surplus		under 50	
Candidate	Count	2nd Count	3rd Count		
Nolan, Patricia M.	3458	-499	2959	0	2959
Bowman, Manikka L.	2768	109	2877	5	2882
Fantini, Alfred B.	2728	38	2766	1	2767
Dexter, Emily R.	2378	95	2473	4	2477
Kelly, Kathleen M.	1882	85	1967	1	1968
Kimbrough, Laurance V.	1856	24	1880	1	1881
Cronin, Fran Albin	1572	52	1624	3	1627
Crutchfield, Jake W.	1039	19	1058	1	1059
Kadete, Elechi M.	846	18	864	1	865
Weinstein, David J.	797	30	827	1	828
MacArthur, Will	795	12	807	0	807
Mitros, Piotr Flawiusz	511	17	528	1	529
Write-Ins	78	0	78	-78	0
Exhausted	0	0	0	59	59
Total valid ballots	20708	0	20708	0	20708
Quota = 2959					
Invalid ballots	1744				
Total ballots	22452				

# 2017 School Committee 4<sup>th</sup> Count

Eliminate  
Mitros.

Votes  
transfer to  
the next  
continuing  
candidate  
on each  
ballot.

Final Official	1st	Nolan surplus		under 50		Mitros transfer	
Candidate	Count	2nd Count	3rd Count	4th Count			
Nolan, Patricia M.	3458	-499	2959	0	2959	0	2959
Bowman, Manikka L.	2768	109	2877	5	2882	69	2951
Fantini, Alfred B.	2728	38	2766	1	2767	20	2787
Dexter, Emily R.	2378	95	2473	4	2477	89	2566
Kelly, Kathleen M.	1882	85	1967	1	1968	28	1996
Kimbrough, Laurance V.	1856	24	1880	1	1881	34	1915
Cronin, Fran Albin	1572	52	1624	3	1627	47	1674
Crutchfield, Jake W.	1039	19	1058	1	1059	32	1091
Kadete, Elechi M.	846	18	864	1	865	42	907
Weinstein, David J.	797	30	827	1	828	52	880
MacArthur, Will	795	12	807	0	807	57	864
Mitros, Piotr Flawiusz	511	17	528	1	529	-529	0
Write-Ins	78	0	78	-78	0	0	0
Exhausted	0	0	0	59	59	59	118
Total valid ballots	20708	0	20708	0	20708	0	20708
Quota = 2959							
Invalid ballots	1744						
Total ballots	22452						

# Personal Observations

When adopting STV for an election,

- Separate ballots
- Let # of rankings = # of candidates – 1  
(Equation for # of rankings updated after the talk. Thanks to Rob Richie for an insight.)
- Use fractional transfers!

Emotionally hard to change from voting for 5 candidates to having a unitary vote. “The #1 choice is overwhelmingly the most important choice” in STV.

# Multi-Winner Voting Strategies

Richie: “I sometimes vote for only one candidate even though I’m allowed to vote for more than one.” [bullet voting]

Landry: “Sometimes I like 6 candidates, but I’m only allowed to vote for 5 so I consider voting for the 5 that most need my vote even if that means that I don’t vote for my favorite.”



# Website Resources

- lwvbc.org, then Teams at Work, then Voting Methods Team (inc. slides from this talk)
- <https://www.cambridgema.gov/Departments/electioncommission>
- Robert Winters' website: <http://rwinters.com/elections/index.html>
- Minneapolis ranked voting reports: <http://vote.minneapolismn.gov/rcv/rcv-history>