

Vote counting methods

We have discussed 3 major (and 2 more minor) vote counting methods:

- (1.2) **Plurality:** most first place votes wins
- (1.3) **Borda count:** highest average ranking wins
- **2nd place is half credit:** like plurality, but 2nd place counts as half a 1st place
- (1.4) **Plurality with elimination:** eliminate the candidate with the least first place votes
- **Survivor:** eliminate the candidate with the most last place votes
- (1.5) **Pairwise comparison:** all head-to-heads, most total wins (ties count half credit)

Each method had good features and bad features. To be precise, we defined “fairness criteria” a vote counting method either satisfied them or not

Fairness criteria

We have discussed 3 major (and 2 more minor) fairness criterion:

- (1.2) **Majority (winner) fairness criterion:** If a candidate has more than 50% of the first place votes, he should win.
- **Majority loser fairness criterion:** If a candidate has more than 50% of the last place votes, he should lose.
- (1.2) **Condorcet (winner) fairness criterion:** If a candidate can beat every other candidate head-to-head, he should win.
- **Condorcet loser fairness criterion:** If a candidate is beaten by every other candidate head-to-head, he should lose.
- (1.4) **Monotonicity:** If a candidate wins one election, then he should also win an election where the only difference is a voter ranked the winner higher. (“more first place votes should help”)
- (1.5) **IIA:** If a loser is disqualified, the winner still wins.

Here is a table describing how well our vote counting methods do:

	MW	ML	CW	CL	Mo	IIA
PI	Y	N	N	N	Y	N
BC	N	Y	N	Y	Y	N
$2 = \frac{1}{2}$	N	N	N	N	Y	N
PE	Y	*	N	*	N	N
Su	N	Y	N	*	N	N
PC	Y	Y	Y	Y	Y	N

Today we will cover the gray row and column

The * means mathematically no, but practically yes

Activity: Finding Condorcet winners

Examine the preference schedule:

	7	7	3	3
1st	E	B	B	E
2nd	B	C	G	B
3rd	G	G	E	D
4th	C	D	F	G
5th	F	A	C	C
6th	A	E	D	A
7th	D	F	A	F

Write down all head-to-head matchups (split up the work in the group)

	A	B	C	D	E	F	G
A							
B							
C							
D							
E							
F							
G							

Who is closest to being a Condorcet winner?

Is there anyone who can claim to be as good? What if we repeat?