FL 2000

Bush: 2,912,790

Gore: 2,912,253

Nader: 97,421

If they had ranked:

2.9 M	2.9 M	.1 M
B	G	N
G	B	G
N	N	B

Using plurality system, B wins (narrowly)

Look at the pairs:

B vs G: B: 2.9 G: 3 G wins!

B vs N: B: 5.8 N: .1 B wins!

G vs N: G: 5.8 N: .1 G wins!

Notice G is the winner in any pairwise contest (involving G)

There's a name for that:

Def A candidate who would win in any pairwise matchup is called a <u>Condorcet winner</u>.

in FL2000, G was a Condorcet winner.

Theorem In an election, there cannot be 2 different Condorcet winners.

Proof Imagine there were 2 Cond. winners, A & B. Then there will be a pairwise contest A vs B. Both A & B cannot both win, so one of them isn't a Cond. winner.

So it's impossible!

A new voting method:

Condorcet's Method Compare all candidates pairwise to find the condorcet winner, then they win the election.

So in FL 2000,

B wins with plurality,

G wins with Condorcet method.

37 voters example:

14	10	8	4	1
A	C	D	B	C
B	B	C	D	D
C	D	B	C	B
D	A	A	A	A

Find the winner with Cond.

A vs B:	A: 14	B: 23
→ A vs C	A: 14	C: 23
A vs D	A: 14	D: 23
→ B vs C	B: 18	C: 19
B vs D	B: 28	D: 9
→ C vs D	C: 25	D: 12

C wins all their pairwise matchups,

so C is the winner using

Condorcet's method.

12	8	7	2
A	B	C	B
B	C	A	A
C	A	B	C

29 voters

A vs B A: 19 B: 10

A vs C A: 14 C: 15

B vs C B: 22 C: 7

No Condorcet winner.

Very often, there is no Condorcet winner. :(

So we don't use it in the real world.

Another voting method:

The Borda Count

Each ranking position gets points.

last place: 0 pts
2nd to last: 1 pt, etc.

Add up the points, most points wins.

Ex 1

1	1	1	pts
A	B	C	3
B	A	D	2
C	D	B	1
D	C	A	0

A : $3 + 2 + 0 = 5$

B : $2 + 3 + 1 = 6$

C : $1 + 0 + 3 = 4$

D : $0 + 1 + 2 = 3$

B wins

Ex 2

3	2	
A	B	2
B	C	1
C	A	0

A: $3 \cdot 2 + 2 \cdot 0 = 6 + 0 = 6$

B: $3 \cdot 1 + 2 \cdot 2 = 3 + 4 = 7$ ← B wins!

C: $3 \cdot 0 + 2 \cdot 1 = 0 + 2 = 2$

FL 2000

2.9	2.9	.1	
G	B	N	2
B	G	G	1
N	N	B	0

Borda:

$$B: 2.9 \cdot 1 + 2.9 \cdot 2 + .1 \cdot 0 = 8.7$$

$$G: 2.9 \cdot 2 + 2.9 \cdot 1 + .1 \cdot 1 = 8.8$$

$$N: 2.9 \cdot 0 + 2.9 \cdot 0 + .1 \cdot 2 = .2$$

G wins!