

Jared and 9 of his fans are in a 35-person class that is deciding where to have lunch. The votes are as follows:

	25	10
1st	Ovid's	Stud Cent
2nd	Stud Cent	Sci Lib
3rd	Sci Lib	Off Campus
4th	Off Campus	Ovid's

	1st	2nd	3rd	4th	
Ovid's	25	0	0	10	= 100 + 10 = 110
Stud	10	25	0	0	= 40 + 75 = 115
Sci	0	10	25	0	= 30 + 50 = 80
Off	0	0	10	25	= 20 + 25 = 45
	(4)	(3)	(2)	(1)	

What is the result of Borda count?

Stud. Cent Subway wins with 115 votes

Is it a good decision? OK. Better than Sci Lib or Off Campus Subway.

However it seems like we asked the wrong question. Instead of "Which subway?" maybe we should ask "subway or ovid's?"

Suppose the decision came down to off campus subway versus any of the other options. Who would win?

OC vs Ovid's : 10 to 25  
OC vs SC : 0 to 35  
OC vs SL : 0 to 35

Off Campus always loses! Condorcet Loser

Is off campus subway a reasonable choice to even consider?

In a way, no, but every losing candidate would eventually be the worst one left.

Write down the preference schedule with off campus subway removed.

25	10
Ovid's	SC
SC	SL
SL	Ovid's

	1st	2nd	3rd	
Ovid's	25	0	10	= 75 + 10 = 85
SC	10	25	0	= 30 + 50 = 80
SL	0	10	25	= 20 + 25 = 45
	(3)	(2)	(1)	

How does Borda count work now?

Ovid's wins

Back to the original 4 options: suppose the decision came down to Ovid's versus any of the other options. Who would win?

Ovid's vs SC : 25 to 10  
vs SL : 25 to 10  
vs OC : 25 to 10

Ovid's always wins! Condorcet Winner

Which option sounds best now? What is the problem with this type of thinking?

Ovid's. The same ideas could have removed Starbucks, last time, but then Ovid's would beat K-Lair. 100% of our class thought K-Lair was the right choice. How do we tell the difference?

This group is trying to decide which is best, option A, B, or C.

	6	5	4
1st	A	B	C
2nd	B	C	A
3rd	C	A	B

How many people prefer A to B? In simpler terms, does the group prefer A to B?  
 $A \text{ vs } B: 6 + 4 \text{ vs } 5, 10 \text{ to } 5, \text{ (A)}$

What about B to C? In simpler terms does the group prefer B to C?

$B \text{ vs } C: 6 + 5 \text{ vs } 4, 11 \text{ to } 4, \text{ (B)}$

What about A to C?

A better than B, B better than C, so surely A better than C?

$A \text{ vs } C: 6 \text{ vs } 5 + 4, 6 \text{ to } 9, \text{ (C)}$  Crazy! Condorcet Paradox

	6	4	4	3	2
1st	A	B	C	C	B
2nd	B	A	A	B	C
3rd	C	C	B	A	A

	1st	2nd	3rd
A	6	4+4	3+2
B	4+2	6+3	4
C	4+3	2	6+4

Who wins if we just count first place votes?

C with 7

Who wins each head-to-head matchup? (check all three)

$A \text{ vs } B: 6 + 4 \text{ vs } 4 + 3 + 2, 10 \text{ to } 9, \text{ (A)}$   
 $B \text{ vs } C: 6 + 4 + 2 \text{ vs } 4 + 3, 12 \text{ to } 7, \text{ (B)}$   
 $A \text{ vs } C: 6 + 4 \text{ vs } 4 + 3 + 2, 10 \text{ to } 9, \text{ (A)}$

Who wins the most head-to-head matchups?

A wins the most

Who wins if we use Borda Count?

$$A: 6(3) + (4+4)(2) + (3+2)(1) = 18 + 16 + 5 = 39$$

$$B: (4+2)(3) + (6+3)(2) + 4(1) = 18 + 18 + 4 = 40$$

$$C: (4+3)(3) + 2(2) + (6+4)(1) = 21 + 4 + 10 = 35$$

B wins