

3
A
B
C

3
B
C
A

3
C
A
B

Looking only at A vs B:

6 prefer A above B,

3 prefer B above A.

Together, they like A more than B.

Also, together they like B more than C.

Also, C more than A

The group has "circular preferences"

Moral: Individual preferences may be logical,
but "group preferences" sometimes are
not logical.

Individual preferences are transitive

if $A=B$ and $B=C$, then $A=C$

or

if $A > B$ and $B > C$, then $A > C$.

Individual preferences are transitive,

But group preferences can be non-transitive

The Condorcet Paradox

- What are different ways we can choose winners for preference-based elections?
- Which way is the best?
which are better or worse?

<u>14</u>	<u>10</u>	<u>8</u>	<u>4</u>	<u>1</u>	← 37 total
A	C	D	B	C	
B	B	C	D	D	
C	D	B	C	B	
D	A	A	A	A	

A has the most 1st place rankings.

1st place: A: 14 (but maybe A shouldn't win)
 B: 4 a majority thinks A is worst.
 C: 11
 D: 8

1st Method The Plurality System

the winner is whoever is ranked 1st place the most often.

"the plurality winner"

in	$\frac{14}{A}$	$\frac{10}{C}$	$\frac{8}{D}$	$\frac{4}{B}$	$\frac{1}{C}$
	B	B	C	D	D
	C	D	B	C	B
	D	A	A	A	A

A is the plurality winner.

"plurality" means more than anybody else.

"majority" means more than half.

A gets a plurality of 1st place votes
(but not a majority)

Often, plurality system doesn't do
very well choosing the winner.

2000 US Presidential election

Bush vs Gore vs Nader

votes in FL were too close to call.

Final vote #s in FL:	$\frac{14}{A}$	$\frac{10}{C}$	$\frac{8}{D}$	$\frac{4}{B}$	$\frac{1}{C}$
	B	B	C	D	D
	C	D	B	C	B
	D	A	A	A	A

B: 2,912,790

G: 2,912,253

N: 97,421 Gore

(N) (D)

Bush
(R)

liberals

conservative

it's accurate to assume the N voters really hated B.

If they had ranked their choices:

2.9M

B
G
N

2.9M

G

B
N

0.1M

N
G
B

being generous to B.

Using plurality, B wins.

If we consider only B v G,

G is preferred by 3M

B 2.9M

Another system trying to do
better than plurality:

Ranked Choice Voting (RCV)

aka "instant runoff" or "transferable vote"

Used in Australia, Ireland, for
congress in ME & AK,
used locally in several states

Do the election "in rounds",
each time, eliminate the one with fewest
1st place rankings.

<u>Ex</u>	<u>38</u>	<u>15</u>	<u>15</u>	<u>7</u>	<u>10</u>	<u>15</u>
	A	B	B	D	C	C
	B	C	C	C	B	B
	C	A	D	B	A	D
	D	D	A	A	D	A

Round 1

A: 38
 B: 30
 C: 25
~~D: 7~~ ← eliminate D.

Round 2

<u>38</u>	<u>15</u>	<u>15</u>	<u>7</u>	<u>10</u>	<u>15</u>
A	B	B	C	C	C
B	C	C	B	B	B
C	A	A	A	A	A

A: 38
~~B: 30~~ ← eliminate B
 C: 32

Round 3

<u>38</u>	<u>15</u>	<u>15</u>	<u>7</u>	<u>10</u>	<u>15</u>
A	C	C	C	C	C
C	A	A	A	A	A

A: 38
 C: 62

C wins using RCV.

Technicality: If in some round there's a tie for last place, All tied people get eliminated