<u>Monotonicity</u>: Boosting the winner should not change the result.
(they should still win)

IRV does not satisfy mono.
(example from last time)

	Mono.	Maj	CWC	unanimity	IIA
Plurality	✓	✓	✗	✓	
Condorcet	✓	✓	✓	✓	
Borda	✓	✗	✗	✓	✗
IRV	✗	✓	✗	✓	
dictatorship	✓	✗	✗	✓	

Does plurality satisfy monotonicity? Yes,

since a plurality winner has the most 1st place votes, if we boost them, they will still have the most 1st place votes, so they still win.

Similar with Borda - boosting the winner gives them more points, so they still win.

Condorcet also satisfies monotonicity: If we have a Cond. winner & we boost them, then they still will win in any pairwise comparison, so they still win!

A very simple criterion

Unanimity Criterion

If <u>all</u> voters prefer X above Y, then Y should not win.

[it doesn't mean X should win, since there may be another even better candidate]

Any system failing unanimity must be pretty bad

Another Method

A bit stupid, like the number 0.

<u>Dictatorship</u> Before the election,

one of the voters is chosen to be the dictator.

Whoever the dictator ranks 1st wins.

(all other votes are ignored)

Dictatorship does satisfy unanimity, since if all voters prefer X above Y, then the dictator prefers X above Y, so Y will not win.

Independence from Irrelevant Alternatives (IIA)

About making "irrelevant" changes from the POV of the winner. These should not change the outcome.

Ex

	3	2
2	A	B
1	B	C
0	C	A

, use Borda.

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

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

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

what if we change $\begin{matrix} B \\ C \\ A \end{matrix}$ to $\begin{matrix} B \\ A \\ C \end{matrix}$?

[This changes nobody's rank with respect to the winner (B). it's "irrelevant"]

The new result:

	3	2
2	A	B
1	B	A
0	C	C

A: $3 \cdot 2 + 2 \cdot 1 = 8$

B: $3 \cdot 1 + 2 \cdot 2 = 7$

C: $0 + 0 = 0$

A wins!

We didn't change B's ranking with respect to anyone else, but this changed the outcome!

Independence from Irrelevant Alternatives Criterion (IIA)

If there is a winner, and we change ballots without adjusting anyone's ranking relative to the winner, then the winner won't change.

our ex!: B won, then we changed $\begin{matrix} B \\ C \\ A \end{matrix} \rightarrow \begin{matrix} B \\ A \\ C \end{matrix}$

this was an "irrelevant" change.

Subtle point about the changes:

the IIA change must not modify any ranking relative to the winner.

like $\begin{array}{c} B \\ C \\ A \end{array} \longrightarrow \begin{array}{c} B \\ A \\ C \end{array}$ is "irrelevant"

but $\begin{array}{c} A \\ B \\ C \end{array} \longrightarrow \begin{array}{c} C \\ B \\ A \end{array}$ This change doesn't count as "irrelevant"!