MA111: Contemporary mathematics

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- HW 3 is due 11:59pm Tuesday, Sep 22nd, 2015
- Exam 1 is in-class on Thursday, Sep 24th, 2015

Today we cover a third fairness criterion

Spoilers

- ${\scriptstyle \bullet}\,$ Before C: B wins 60% to 40%
- After C: A wins 40% to 35% to 25%
- If the 60% had agreed on B, then B would have won
- Even the 25% would be happier
- C didn't win, but by entering they changed the winner
- C is called a **spoiler**



Plurality with elimination

- PwE is also called "single transferrable vote" (you get one vote, but you can change it if your candidate loses)
- That way if there is a spoiler (that loses) you can change your vote to your next most favorite

- Who wins with PwE in this election?
- Who had the majority of last place votes?
- Who would win if we eliminated them instead?



	40%	35%	25%
1st	A	С	В
2nd	В	В	А
3rd	С	А	С

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IIA fairness criterion

- the **IIA** fairness criterion requires that a voting method never have spoilers
- Jack thinks that is a bit much to ask, but at least asks that a majority loser cannot be a spoiler. The JJA.
- Plurality can have spoilers, so it violates the IIA (and JJA)
- Plurality with elimination can have spoilers, so it violates IIA (and JJA)

• What about Borda count?

	60%		
1st	Α	В	С
2nd	В	С	В
3rd	С	А	А

Changing voters



- Who does plurality with elimination say wins the left election?
- The 33% is pissed and asks for a recount.
- 2% decide to vote for the winner.
- Who does plurality with elimination say wins the right election?
- Did the 2% who lied improve things for the 33%?
- What is the name of this strategy?

Monotonicity

- In the previous election, 2% of the voters changed their vote to the old winner (leaving the other candidates in the same order)
- This made the winner lose (and their second favorite win)
- At the beginning of the chapter we called 1st place votes "good" and last place votes bad
- But in plurality with elimination, first place votes can be bad!
- **Monotonicity** is the fairness criterion that says that is an awful way to decide an election.

If some voters leave their ranking the same except for moving the winner up to the top, then the voting method should not change the winner