

# Don't Vote: Judge!

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# Voting Systems

- Voting: Elections or competitions
- Goal: Pick the winner!
- How?

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- Usual setup: **Order** candidates from best to worst
- Single-round: Pick the person with most votes
- Two-round: Two best candidates go to the second round
- Whole field of mathematics concerns voting systems!

# Voting Systems: Problems

- Condorcet's Winner: Candidate who, when compared with every other candidate, is preferred by more voters.
- **Condorcet's Paradox:** Not every ranking has Condorcet's Winner!

Voter	1	2	3
1	A	B	C
2	B	C	A
3	C	A	B

**Arrow's Impossibility Theorem:** Ranking cannot satisfy all of:

- If every voter prefers alternative X over alternative Y, then the group prefers X over Y.
- If every voter's preference between X and Y remains unchanged, then the group's preference between X and Y will also remain unchanged (even if voters' preferences between other pairs like X and Z, Y and Z, or Z and W change).
- There is no "dictator": no single voter possesses the power to always determine the group's preference.

# Voting System: Strategies and meaning

- Vote may mean strong support, weak support or merely avoidance of worse candidate
- Votes may be chosen differently if preferred candidate will not gain enough support
- Similar candidates stole votes from each other!
- If we *rank* candidates, third place may mean very different things for different people

# Way Out: Judging!

- Do not have voters order candidates, but *grade* them!
- Grading works best using school grades, using words
- **Majority Grade** is the grade that obtains majority against any other grade
- Ties are resolved by percentage that gives higher grade than the majority grade
  
- Paradoxes mostly disappear! Fair result
- More intuitive method for voters
- Honest voting, resists manipulation
- Precise evaluation: Mathematically provable robustness

# Thanks

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