



## Reducing Manipulability

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## CRITERIA FOR VOTING SYSTEMS

Veto...

Set of voting systems

Borda...

Informed majority coalition criterion (**InfMC**)

A majority may choose the outcome when they know the other votes.

Range voting, Approval, Coombs...

Ignorant majority coalition criterion (**IgnMC**)

A majority may choose the outcome.

Plurality, Two-round, IRV, Bucklin...

Majority favorite criterion (**MF**)

Elects a candidate when she is preferred by a majority.

Baldwin, Dodgson, Kemeny, Maximin, Nanson, Schulze, Tideman...

Condorcet criterion (**Cond**)

Elects the Condorcet winner when there is one.

## GOAL: MINIMIZE THE MANIPULABILITY RATE

$$\rho(f) = \mathbb{P}(\text{voting system } f \text{ is manipulable})$$

## TRANSFORMATIONS

$f$

Initial voting system  $f$

$f^c$

**Condorcification of  $f$**

- Elects Condorcet winner when she exists.
- Otherwise, same outcome as  $f$ .

$f^{cs}$

**Best slice of  $f^c$**

- Depends only on orders of preference.
- Meets the Condorcet criterion.

## CONDORCIFICATION THM.

If  $f$  meets **InfMC**:

$$\rho(f^c) \leq \rho(f).$$

## SLICING THEOREM

If voters are independent:

$$\rho(f^{cs}) \leq \rho(f^c).$$

## CONSEQUENCES

To minimize manipulability while keeping **InfMC**, one may restrict to voting systems that:

- Depend only on orders of preference,
- And meet the Condorcet criterion.