Reducing Manipulability
François Durand, Fabien Mathieu, Ludovic Noirie

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CRITERIA FOR VOTING SYSTEMS

<table>
<thead>
<tr>
<th>Set of voting systems</th>
<th>Veto...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Borda...</td>
</tr>
<tr>
<td></td>
<td>Range voting, Approval, Coombs...</td>
</tr>
<tr>
<td></td>
<td>Plurality, Two-round, IRV, Bucklin...</td>
</tr>
<tr>
<td></td>
<td>Baldwin, Dodgson, Kemeny, Maximin, Nanson, Schulze, Tideman...</td>
</tr>
<tr>
<td>Informed majority coalition criterion (InfMC)</td>
<td>A majority may choose the outcome when they know the other votes.</td>
</tr>
<tr>
<td>Ignorant majority coalition criterion (IgnMC)</td>
<td>A majority may choose the outcome.</td>
</tr>
<tr>
<td>Majority favorite criterion (MF)</td>
<td>Elects a candidate when she is preferred by a majority.</td>
</tr>
<tr>
<td>Condorcet criterion (Cond)</td>
<td>Elects the Condorcet winner when there is one.</td>
</tr>
</tbody>
</table>

GOAL: MINIMIZE THE MANIPULABILITY RATE

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

TRANSFORMATIONS

- **Initial voting system** $f$
- **Condorcification of** $f$
  - Elects Condorcet winner when she exists.
  - Otherwise, same outcome as $f$.
- **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.