Reducing Manipulability
François Durand, Fabien Mathieu, Ludovic Noirie

To cite this version:
François Durand, Fabien Mathieu, Ludovic Noirie. Reducing Manipulability. Fifth International Workshop on Computational Social Choice (ComSoC - 14), Jun 2014, Pittsburgh, United States. 2014, <http://www.cs.cmu.edu/ arielpro/comsoc-14/index.html>. <hal-01095992>

HAL Id: hal-01095992
https://hal.archives-ouvertes.fr/hal-01095992
Submitted on 16 Dec 2014

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
# Reducing Manipulability

François Durand, Fabien Mathieu and Ludovic Noirie

## Criteria for Voting Systems

<table>
<thead>
<tr>
<th>Voting System</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veto...</td>
<td>Set of voting systems</td>
</tr>
<tr>
<td>Borda…</td>
<td>Informed majority coalition criterion (InfMC)</td>
</tr>
<tr>
<td>Range voting, Approval, Coombs…</td>
<td>Ignorant majority coalition criterion (IgnMC)</td>
</tr>
<tr>
<td>Plurality, Two-round, IRV, Bucklin…</td>
<td>Majority favorite criterion (MF)</td>
</tr>
<tr>
<td>Baldwin, Dodgson, Kemeny, Maximin, Nanson, Schulze, Tideman…</td>
<td>Condorcet criterion (Cond)</td>
</tr>
</tbody>
</table>

- **Informed majority coalition criterion (InfMC)**: A majority may choose the outcome when they know the other votes.
- **Ignorant majority coalition criterion (IgnMC)**: A majority may choose the outcome.
- **Majority favorite criterion (MF)**: Elects a candidate when she is preferred by a majority.
- **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

- **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.**