

Information, interaction and manipulation in voting

Citation for published version (APA):

Veselova, Y. A. (2023). *Information, interaction and manipulation in voting*. [Doctoral Thesis, Maastricht University]. Maastricht University. <https://doi.org/10.26481/dis.20230918yv>

Document status and date:

Published: 01/01/2023

DOI:

[10.26481/dis.20230918yv](https://doi.org/10.26481/dis.20230918yv)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

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Impact of the thesis

This thesis contributes to the area of manipulability of social choice rules. The problem of manipulation is well-known in social choice theory, since A.Gibbard and M.Satterthwaite many authors studied this question from theoretical, experimental and computational perspective. However, classical approaches to modelling strategic behavior of voters in voting are quite static. The goal of our research is to make models which are more flexible, i.e. can take into account various parameters, and, as a consequence, which are more realistic.

We argue that information available to voters and their view of other voters' behavior are the crucial aspects that affect individual manipulation incentives. For example, we show that for many rules voters that have an incentive to manipulate exist almost in every possible situation if they have positive expectations about their coalition members and possess information only about the winners from an opinion poll. On the other hand, some rules do not guarantee that a voting result will not get worse if some of your allies do not support group manipulation. This fact constitutes an obstacle for collective manipulation of these rules. Other rules, as revealed by our research, do not pose such a threat to the manipulator, so they can be considered as more easily manipulable.

Finally, in addition to the uncertainty about the true preference profile (due to the incompleteness of information), we consider the uncertainty about all other manipulators' actions. We study how restrictive the combination of these two types of uncertainty is for manipulation - a question which has not been considered before. It turns out that for certain conditions rules do not allow for manipulation anymore.

All these results can be helpful when choosing a social choice mechanism for a given collection of parameters, such as the type of public information, the number of voters and alternatives, opportunities for communication for voters. Or, alternatively, they can show how to restrict the parameters if a social

choice rule is fixed. The area of application of social choice theory has been widening in recent years due to the spread of information technologies. The problem of preference aggregation arises not only in human voting, but also in decision making with autonomous software agents, whose computational ability is much stronger. For this reason, it becomes especially important to know the formal restrictions existing in aggregation methods for their best use.