

DONALD G. SAARI:

**Basic Geometry of Voting**

Springer-Verlag, Berlin – New York – London 1995.

xii + 300 pages, 102 figures.

ISBN 3-540-60064-7

Voting systems and processes represent an interesting topic for mathematics in social and political sciences. Its serious consequences for everyday life of various communities motivates thorough discussion and re-considerations about particular aspects of voting procedures, namely about rational voting strategies and about voting systems avoiding impassable results. The referred book aims to show how the complexities and intricacies of elections can be transformed into quite lucid geometric concepts.

The main destination of the book is to be used in learning political sciences, and the arrangement of its text corresponds to it. It is parted into small but structured units: 119 subsections form 23 sections which are grouped into 5 main chapters (the sixth chapter, named Notes, brings marginal comments to previous chapters, mostly concerning their relations to some other works). The book is concluded by quite representative References (124 items) and Index. To enable the reader to test his understanding the explanation, each section is followed by exercises.

The first chapter, *From an Election Fable to Election Procedures*, catalogues some of problems connected with elections and illustrates them by an example of hypothetical academic chair. The second chapter, *Geometry For Positional And Pairwise Voting*, starts with the geometrical representation of standard terms of voting. The next chapter, *The Problem With Condorcet* presents an analysis (mostly critical) of some classical problems and standards, some of which are developed and discussed from the first serious attempts to give a consistent theory of voting. These attempts have been done in the last quarter of the 18th century and they are connected with the names of J.-C. Borda, J. Mascalart and M. Condorcet. One of essential sections of this chapter analyses the sense and consequences of Arrow theorem on aggregation of votes. The analyses introduced in this chapter are interesting and in many cases suggesting new views on some traditional judgments. The fourth chapter, *Positional Voting and the BC*, where BC denotes the classical “Borda Count”, introduces more advanced geometric methods developed to analyze positional procedures (generalizations of standard plurality vote). The geometrical approach simplifies the understanding of some classical results and the derivation of some new ones. Finally, the last chapter, *Other Voting Issues*, extends and generalizes the former voting issues. In addition to the single profile ones, dealt in the previous chapters, the issues involving several profiles are described. They include such problems like voting manipulated by pre-selection or robustness of voting and balance of compensating errors. The last chapter *Notices* was already mentioned above.

The referred book has contributed to the literature on voting systems and election problems by an interesting item. Even if it is supposed to be mainly used by students, the set of its potential readers can be much wider. It offers a comprehensive survey of various approaches to the voting situations, starting by the historical ones. Their geometrical presentation opens qualitatively new view on many of them and completes them by several new results. The book is evidently useful for anybody who is interested in the theory of voting systems, and it can be interesting for many others who study political sciences and use mathematical methods in the research of social phenomena.

*Milan Mareš*