

Non-standard topics in statistics, stochastics, decision theory and other areas of applied mathematics

List of possible topics (not exhaustive)

A) Item response theory (IRT) and measurement theory:

- Goodman scaling vs Rasch Scaling: The Rasch paradox
- Paradoxes e.g. in the multidimensional Rasch model
- On the possible psychophysical laws
- (Theory of conjoint measurement (e.g., in the context of the Rasch Model), (advanced topic!))
- Knowledge space theory
- Cognitive diagnosis models
- Analysis of non-standard data (e.g. ranking data)
- Nonstandard methods of analysis (e.g., data depth) (possibly including analysis for non-standard data)
- Stochastic models for non-standard data (e.g., for ranking data)

B) Data-oriented vs. model-oriented approaches in statistics:

- Parametric vs non-parametric methods
- Parametric vs robust methods
- Induction, deduction(, abduction) and transduction in machine learning and statistics (realism vs instrumentalism)
- (The Duhem-Quine problem in statistics)

C) Decision theory:

- (Generalized) Stochastic Dominance as an Approach to Decision Making under Uncertainty
- Decision Theory as a Coherence Test

- Case-based Decision Making
- The Decision Model of Savage

D) Revealed preference theory:

- Classical Abstract Choice Theory and the Concept of Rationalizability

E) Social choice theory:

- Possibilities and Impossibilities in the Theory of Social Choice: The theorems of Arrow and Sen and their consequences
- Manipulation of Voting Schemes: The Gibbard-Satterthwaite theorem and its consequences