Formale Systeme 2: Theorie

1 Social Choice

Wahlverfahren	**Eigenschaften**
Borda Count	Positional Scoring Rule with $m-1$ to 0
Condorcet	Winner only exists sometimes
Plurality Rule	Ballot only includes one candidate Positional Scoring Rule with $1, 0, 0, \ldots$
Plurality with Run-Off	No-Show Paradox (violates monotonicity)
Positional Scoring Rule	Violates Condorcet principle
Copeland Rule	Satisfies Condorcet principle Tournament Solution
Tournament Solutions	Majority Graph
Kemeny Rule	Satisfies Condorcet principle Based on weighted majority graph
Voting Tree (Cup Rule)	Satisifies Condorcet principle Most such rules violate neutrality
Single Transferable Vote (STV)	No-Show Paradox (violates monotonicity)
Approval Voting (AV)	Ballots cannot be modelled as linear orders over the set of alternatives
Median Voter Rule	Different ballot domain: predetermined left-to-right ordering, single-peaked preferences Satisfies Condorcet principle Strategy-proof Weakly Pareto Independence of Irrelevant Alternatives
Banach-Knaster Last-Diminisher Protocol	Each agent is guaranteed a proportional piece
Gale-Shapley Algorithm	Stable matching for "marriage problem"

Theorem	**Eigenschaften**
May's Theorem	Two alternatives Anonymity (order of voters irrelevant) Neutrality (order of candidates irrelevant) Postive Responsiveness (winner becomes unique if ranking increases) $\Leftrightarrow$ Plurality Rule
Young's Theorem	Anonymity Neutrality Reinforcement (common winner of groups is total winner) Continuity (repeat voters until their winner wins in total) $\Leftrightarrow$ Positional Scoring Rule
Arrow's Theorem	Three or more alternatives Weakly Pareto ($b(x \succ y) = \mathcal{N} \Rightarrow y \notin F(b)$) Independence of Irrelevant Alternatives $\Leftrightarrow$ Dictatorship
Gibbard-Satterthwaite Theorem	Resolute voting procedure (exactly one winner) Three or more alternatives Surjective (any candidate can win) Strategy-proof (result never improves for ballot with false preference) $\Rightarrow$ Dictatorship
Black's Median Voter Theorem	Odd number of voters Single-peaked ballots $\Rightarrow \exists$Condorcet winner and it is elected by median voter rule