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Power, Freedom, and Voting is an interdisciplinary book consisting of 22 articles that measure, discuss, and analyze power in politics and society, responsibility, as well as efficiency and stability of social and political systems. Written by leading researchers in economics, political science, and philosophy, the book also explores philosophical foundations of power, trust, freedom and fairness. This review briefly introduces into key points and findings in each of the individual chapters.

Chapter 1: Social Power and Social Causation: Towards a Formal Synthesis

Matthew Braham

The introductory article is a philosophical treatment of causality and responsibility. Several definitions of causality principles are introduced, based on alternative concepts of necessary and sufficient conditions for an event to happen, while there is a possibility to influence the event or avoid it to happen. The author shows that causality defined throughout the NESS principle is somewhat more general than the concept of power, because (loosely speaking) there is a substantial difference between a minimal winning coalition and a minimally sufficient set of conditions. This is because leaving one member out of the minimal winning coalition has an fundamental impact on the final outcome (prevents the outcome to come true), while leaving one member (or condition) out of the minimally sufficient set of conditions does not

have to prevent the outcome from coming true. Thus, the member who was left out can still be responsible for the outcome (no matter if it would happen without his or her contribution).

Chapter 2: Power Indices Methodology: Decisiveness, Pivots, and Swings

František Turnovec, Jacek W. Mercik, Mariusz Mazurkiewicz

The authors discuss measurement of voting power by means of three widespread power indices, Shapley-Shubik index, Penrose-Banzhaf index and Holler-Packel index. Their chief claim is that all the indices can be introduced as special cases of a generalized power index. The generalized power index yields the probability of being in swing position in a pivotal group, which is a subgroup of all the voting bodies. This probability is computed throughout the introduction of Stilling's numbers of the second kind. Importantly, the index is constructed without necessity to refer to cooperative game theory. The authors also qualify objections to Shapley-Shubik index as a P-power concept.

Chapter 3: Further Reflections on the Expediency and Stability of Alliances

Dan S. Felsenthal, Moshé Machover

In this chapter, the authors examine the expediency and stability of alliances using cooperative non-transferable utility game derived from a simple voting game. Penrose-Banzhaf index is used as the measure of power. The basic idea is to divide voting process into two steps. The

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first step is voting within a bloc of voters. In the second part, each bloc behaves as a single voter. A *feasible* alliance is such an alliance (bloc) in which each single voter has at least the same power as it would have without joining the alliance; it is an *expedient* alliance if each single voter has higher power than it would have without joining the alliance. In the expedient alliance, each member benefits from joining it compared to voting as single voter. This concept shows that a dummy voter (which has zero power in the second step) can have non-zero power when being part of an alliance. In such a case, the initially dummy voter may have an impact on the final outcome of the voting process.

The authors apply this principle on the Council of Ministers by the Treaty of Rome, where there were just six countries: Italy, France, Germany, Belgium, the Netherlands and Luxembourg, with weights assigned to these countries as follows: 4, 4, 4, 2, 2, 1. The qualified majority rule was then in effect. In such a case, Luxembourg was a dummy voter, because no winning coalition with Luxembourg would be losing without Luxembourg. However, an alliance of Belgium, the Netherlands and Luxembourg, which pre-votes each proposal and then acts as a single voter according to the result of this pre-voting procedure, is a coalition, where Luxembourg has positive power.

Chapter 4: Positional Power in Hierarchies

René van den Brink, Frank Steffen

This article studies voting in hierarchical structures, where some decisions can be made only by actors on different levels of the hierarchy represented by transitive, anti-symmetric and single topness domi-

nance structure. This structure can be represented by a directed tree.

The authors first describe the decision-making mechanism in the form of an extensive form game and then introduce power measurement in hierarchical structure and define the power based on the probability of being in a swing position. The distinction between strong and weak swing is shown as a relatively new and necessary due to the sequential structure. The strong swing enables an actor to alter a unique outcome into another unique outcome while weak swing enables to alter a unique outcome into a non-unique outcome. Finally, the authors measure power of an actor in the hierarchical structure as the weighted sum of scores, where weights are the potential swings in all action profiles.

Chapter 5: A Public Help Index

Cesarino Bertini, Gianfranco Gambarelli, Izabella Stach

This chapter offers axiomatization of a new power index. One of its unusual features is that it assigns positive value to a dummy voter. The public-help index is compared with the well known public-good index defined by Holler (1978). The public help index takes into account all winning coalitions, not only the minimal ones taken into account by public good index. The main theoretical difference between these two power indices is that public help index does not require monotonicity restriction and is defined only for non-null games, i.e. games with at least one winning coalition. The authors prove that any weighted majority game with power assigned to players by the public help index satisfies the symmetry axiom (power is independent of names of the players), efficiency axiom (sum of

the powers assigned equals one), the zero player axiom (zero power is assigned only to the zero player, i.e. player that does not belong to any winning coalition) and the PHI-mergeability axiom (the weighted sum of the powers assigned to the merged games defined in the article is equal to the weighted sum of the powers of the component games). Then authors prove that only the public-help index satisfies this set of axioms.

The most important result of the article is the proof of public help index being globally monotonic, i.e. whenever the weight of one player in the weighted majority game increases, while all the other weights non-increase, the power assigned to this player does not decrease. By Turnovec (1998), the global monotonicity implies local monotonicity whenever the power index is symmetric. Therefore, as the authors conclude, the public help index is both globally and locally monotonic.

Chapter 6: Shapley-Shubik vs. Strategic Power: Live from the UN Security Council

Stefan Napel, Mika Widgrén

This chapter describes three ways to assign powers to members of the UN Security Council, which consists of five permanent members and ten elected members. The trick in the voting of UN Security Council is that a resolution has to be approved by all five permanent members and at least four elected members.

The first way to estimate of power of a permanent and an elected UN Security Council members is to compute sensitivity of outcome to a slight change of preferences of each member. Assuming all the preferences are independent and uniformly distributed, Nash bargain-

ing among permanent and among elected members, and risk-neutrality, the power assigned to a permanent member is approximately 0.06270 and to an elected member is approximately 0.00163. This can be interpreted as a permanent member having about 40 times higher power than an elected member.

The second way is based on Shapley-Shubik index and characteristic function. The probability of member being in a pivotal situation is computed by a relatively complicated computation, which is not explicitly described in the article. Value added rather comes in the form of less assumptions required, at least comparing to the first approach. The third way presented is based on the Owen's multilinear extension, as introduced in Owen (1972).

Chapter 7: Modified Power Indices for Indirect Voting

Guillermo Owen, Ines Lindner, Bernard Grofman

This article offers a new research insights on the US Electoral College using the framework of multilinear extension. The authors create a model based on the partial differential equation of heat conduction. This equation describes the change of heat in time in a particular point in space. The authors apply this equation to the change of preferences of voters, assuming there are just two parties, and there is a way how to measure the public opinion. Then they compute the autocorrelation function from the solution to the equation of heat conduction and using this function, they compute the variance of the sum of the voters' positions. The most powerful states are those with political power close to the median of the real valued preferences.

Statistical analysis is provided to estimate

parameters on the real world data. The probability of being in a pivotal situation is computed for each US Electoral College state. The results are very interesting, since most of the states have probability close to zero and only 11 out of 50 states have probability higher than 1%. The highest probabilities are assigned to Montana, Ohio, Arkansas and West Virginia, which are the only states with probability of being in a pivotal situation over 10%.

Chapter 8: Pivotal Voting Theory: The 1993 Clinton Health Care Reform Proposal in the U.S. Congress

Joseph Godfrey, Bernard Grofman

This article aims at locating decision-makers who are sensitive to lobbying on an ideological dimension. The authors apply two measures, ADA (Americans for Democratic Action) score describing the ideological position normalized in the closed continuum interval from 0 to 100, and NFIB (National Federation of Independent Business) score taking values from one to five points. ADA equals zero for perfectly conservative political preferences, and 100 for perfectly liberal political preferences. NFIB in the middle of the five point scale means a high potential to change preference, whereas the extremal values indicate being uncompromising in their preferences.

The authors create two dimensional space of ideological preferences and try to identify potentially swing voters using so-called Shapley-Owen scores. The Shapley-Owen scores are assigned to each voter as the proportion of lines where the voter is pivotal to all possible lines in the space of all preferences. It is said the voter is pivotal in a line if the perpendicular projection of his bliss point (totally pre-

ferred point) to this line is in the middle of the perpendicular projections of all voters' bliss points to this line. Such a point is called median point.

The theory is used to locate members of the US Senate and members of the US House of Representatives on the three most lobbied committees onto the two dimensional policy space. The source data are their attitudes toward the health care reform presented by Clinton administrative. Further, each committee member is assigned a spatial analogue of the Shapley value of pivotal power, namely the Shapley-Owen value described shortly above. Then, the Shapley-Owen values and NFIB scores are compared to data on which legislators on these committees were actually lobbied. The authors show that Shapley-Owen scores and NFIB scores generally coincide for legislators who appear centrally placed in the policy space, but they can substantially differ among outliers.

Chapter 9: Coalition Formation Theories Revisited: An Empirical Investigation of Aumann's Hypothesis

Vincent C. H. Chua, Dan S. Felsenthal

This article empirically tests a hypothesis stated by the 2005 Nobel Prize laureate Robert J. Aumann in 1995 in an interview by Eric Van Damme. The hypothesis states that a leader of a forming government maximizes Shapley value of his party. By maximizing own Shapley value, i.e. probability of a party being in pivotal situation, the coalitions are not minimal, because in a minimal coalition, any party leaving the coalition will change the outcome from a winning to a losing coalition. The authors introduce several modifications of Aumann's hypothesis, and pro-

vide statistical analysis of 85 closed coalitions from the history of parliamentary elections in nine countries. All variants of the Aumann's hypothesis are rejected as good predictive theories of coalition formation and alternative theories are suggested: Gamson-Riker's cheapest coalition theory, and Axelrod-Leiserson minimal range theory.

Chapter 10: Coalition Formation, Agenda Selection, and Power

Friedel Bolle, Yves Breitmoser

This chapter treats formateur (unique party that is entitled to form a coalition) in a non-cooperative bargaining model, and from this model, it calculates bargaining power of the formateur and the coalitional candidates. The main innovation is public element of the communication between the formateur and the coalition candidates. The public expects the parties to accept proposals where their aspirations are satisfied. As a result, the bargaining equilibrium involves announcing a very low aspiration level by coalition candidates. The authors discuss the bargaining power of the parties in their model and propose construction of new ex-post power indices. Thereby, they also criticize the traditional concept of ex-ante power.

Chapter 11: Democratic Defenses and (De-)Stabilization

Werner Güth, Hartmut Kliemt, Stefan Napel

This article deals with the rules of rules change. The focus is given to constitutions and to the highest authorities and whether they can somehow restrict themselves or prevent certain proposals from being accepted. It deals with the way how the controllers will be controlled and that self-control can eliminate the need of con-

trol and thereby the need of controllers.

The authors introduce a model of Democratic Majority Cartel in a democracy. In this model, low-risk anti-democratic parties and high-risk anti-democratic parties are introduced and the probability of an abolishment of democracy throughout democratic process is studied. The outcome of the model is the optimal power share of the anti-democratic parties in the cartel, which may amount to zero. Then, anti-democratic parties have to be kept out of having any power in the cartel formed by purely democratic parties.

Chapter 12: The Instability of Power Sharing

Steven J. Brams, D. Marc Kilgour

The authors present three models of instability of power sharing in a committee and apply their models to divisions of previously united members of a coalition, such as state unions, mentioning the former Soviet Union, Yugoslavia and Czechoslovakia, and families facing divorce.

The first model is a one-shot sequential game of fight without deterioration of assets. Here, it turns out that power-sharing is impossible and both players maximize their expected share by attacking their opponent first. Hence, both players has a good reason to preempt. The second model is generalization into repeated turns with constant discount factor. Since the condition for power-sharing is identical like in one-shot game, also the results are identical.

The third model introduces damage to assets. In this model, power-sharing is possible, and the authors find out under what necessary and sufficient conditions attack-free power-sharing occurs. The subset of the unit square where fighting does

not take place is however relatively small, hence the authors conclude their results are profound pessimistic.

Chapter 13: The Power to Propose versus the Power to Oppose

Donald A. Wittman

This chapter compares proposal power and veto power within the context of a majority rule voting system. Each proposal player, as well as each veto player, is assigned single-peaked preferences in one-dimensional space. Any veto player can prevent the proposal from being accepted. In all cases considered, the following sequence holds: (i) The proposer offers a bill to replace the status quo. (ii) The legislature votes. (iii) If the bill passes the legislature, the veto player(s) then decide whether to veto the bill. If the bill is not vetoed, it becomes a law. In this sequential game, several relatively straightforward theorems and their proofs are derived. The main conclusion is: If proposers propose from right to left, the only critical vetoer is the leftmost one. By acting strategically, the other vetoers can be made powerless.

Chapter 14: Divergence in the Spatial Stochastic Model of Voting

Norman Schofield

The chapter offers an empirical model demonstrating that elections exhibit at least local Nash equilibria. This puts down some arguments against centripetal tendency of political strategies. The argument is based on a spatial stochastic model of voting with valences and sociodemographic characteristics, used for an empirical study of five Israeli elections in 1988, 1992, 1996, 1999 and 2003. Valence stands for voters' judgments about positively or negatively evaluated condi-

tions which they associate with particular parties or candidates. These judgments could refer to party leaders, integrity, moral stance or charisma, and the ability to deal with different political problems.

The positions of preferences of each political party in Israel are estimated. Then, the author argues that to maximize the voting share is not the same as trying to capture the median voter; what really matters is the valence of the political party. The author then validates the "mean voter theorem" using a formal stochastic model and concludes that existence of a global Nash equilibrium at the electoral median is very unlikely, but the sufficient condition for a local non-median Nash equilibrium is much less stringent. In effect, there may be more local equilibria.

Chapter 15: Closeness Counts in Social Choice

Tommi Meskanen, Hannu Nurmi

The authors start the chapter by providing a brief survey of voting systems from ancient ages, continuing in medieval ages and stopping in recent voting systems development. They classify the systems in three classes: (i) Single scrutiny (including single vote method, double vote method, Borda count). (ii) More than one voting (including French method of double elections). (iii) More than one scrutiny, but the voters vote once (including Ware's method, Vanetian method, Condorcet's practical method and Nanson's method).

To generalize the systems by means of the theory of metric spaces and algebraic structures, distance of two rankings is defined by the number of inversions of consecutive choices needed to transform one

ranking into another. Then, the distance between two preference profiles is then defined as the sum of all the distances between corresponding rankings from one profile and rankings from the second profile. Finally, the distance between a profile and a set S of profiles is defined as the minimum of profile distances between this profile and all profiles from the set S . Using these definitions, the authors are able to define in an easy way some of the most significant current voting systems.

Chapter 16: Freedom, Coercion and Ability

Keith Dowding, Martin van Hees

This predominantly philosophical article deals with the freedom of choice and its exact definition. It challenges prevailing axiomatic approach, and calls for the integration of the concept of power and freedom as a challenge for future research.

A distinction between ability and ableness is made so that ableness is considered as ability and opportunity together. Opportunity to do something is considered to exist if the means needed to perform an action are available. Opportunity is therefore independent of inclinations or willingness to do something. Two special kinds of abilities are developed, the generic and the time-specific. For example, a famous piano player has the generic ability to play the piano but not the time-specific when hanging in the air and suffering vertigo.

Following the previous ideas, freedom is defined as generic ableness and as specific ableness. Authors provide exact definitions of both and analyze them in detail using examples. The article is useful as a baseline for the research of freedom and unification of power and freedom concepts.

Chapter 17: Guarantees in Game Forms

Marlies Ahlert

The aim of this article is to propose a method of measuring the range of control individuals have in different game forms over the level of welfare they can secure to themselves. The opportunity sets are defined as the set of states such that the individual can secure himself at least the welfare of that state independent of the strategies of other individuals.

This concept is specifically applied to the dictator game and the ultimatum bargaining game. The guarantees that can be given to the two players are compared under different assumptions on the ordering of the outcomes of the game. Properties of the ranking in terms of guarantees are derived for cases where certain types of a subgame forms of a given game form are considered. The more decisions in a game have been made by other players, the higher will be the welfare level that can be guaranteed to any individual.

Chapter 18: Individual Control in Decision-Making and Attitudes Towards Inequality: The Case of Italy

Sebastiano Bavetta, Antonio Cognata, Dario M. A. Patti, Pietro Navarra

The paper empirically demonstrates that individuals who enjoy high levels of autonomy also value income differences more than those who enjoy less of autonomy. The authors, from which three are Italians, use Italy as a case study, drawing especially from data by the World Value Survey project on the preferences for redistribution of income, autonomy, political orientation, attitude to competition, attitude to private ownership, trust in people, and job opportunity. The results of

an econometric analysis based on 2000 interviews shows that in the most complex model, except marital status and sex, almost all variables are statistically significant, however the pseudo R^2 is very low.

Chapter 19: The Principle of Fairness: A Game Theoretic Model

Luciano Andreozzi

The author discusses the principle of fairness as defined in Hart (1955) by which an individual receiving a benefit from an action initiated by other individuals is under an obligation to do his or her part and hence can be legitimately coerced to do so. This concept implies existence of obligations that are independent from individual consent.

The author restricts the principle of fairness as follows: (i) Individuals who are asked to contribute obtain a benefit from the public good which is at least as large as the cost they are required to pay. (ii) Each individual has voluntarily accepted the benefits of the arrangement or taken advantage of the opportunities it offers.

Such a definition of fairness is closely related to the public goods production, and corresponds to strong Pareto improvements. In context of fairness, it is crucial to note that the public goods must be not only non-rival and non-excludable, but also non-optional (the individuals who benefit from their production cannot avoid enjoying them).

Chapter 20: Power, Productivity and Profits

Frederick Guy, Peter Skott

In an efficiency wage model, this chapter explores implications of a power-biased technical change on the change in in-

come distribution. Suppose each employee has assigned some power over the outcome relevant for employer, and employers have power over their employees through firing them. The technological change then can affect the balance of employees' power over employers and employers' power over employees.

This change and its implications are studied in the context of a CES-production function with constant returns to scale and Hicks-neutral technological change. Workers' choice of effort is determined by the cost of job loss and the sensitivity of the risk of job loss to variations in effort. The authors provide static analysis of the model and discuss its outcomes. A major conclusion is that multiple interior equilibria may occur in the model.

Chapter 21: Trust, Responsibility, Power and Social Capital

Timo Airaksinen

The article deals with trust as a form of social capital and discusses responsibility as one of the sources of the trust. Social capital can be understood in two different ways: as a ground for action coordination between rationally prudential agents (individual and institutional), or as a characterization of social life of cooperation according to trust-related virtue.

The author provides with a short philosophical analysis of the concept of trust and reliability, which he strongly distinguishes from each other. He divides the trust into full trust, and weak trust. The weak trust is trust in the form of reliability or belief that something will behave or work in predictable manner. The full trust is mutual, long-lasting and is not focused on reliability in satisfying personal desires of the trustor.

Chapter 22: Exploiting *The Prince*

Manfred J. Holler

By revisiting Machiavelli's work *The Prince*, this chapter touches upon several recent issues of political theory: the aggregation of preferences, the origin of the state and the law, the status of power and morality in politics, and the dynamics and efficiency of political systems. First, Machiavelli's view is shown to be surprisingly consistent with the Arrow's impossibility theorem as he states that only the undivided will of the prince can guarantee the consistency that is necessary to organize a state and to bring about good laws. In other words, by Machiavelli, it is possible to aggregate preferences only by taking into account just a single preference ordering. The major part of this discussion is devoted to the analysis of the reasons of the decline of the Roman Empire.

Also, several Machiavelli's ideas are presented in the context of political stability and power: End justifies the means. Republic is the most stable political institution. The public good is an instrument for the prince, not an aim. The main interests of a prince is the striving for power and glory.

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