



# Looking for a "genuine Science of Politics"

*William H. Riker and the game-theoretical turn in political science: late 1950s-early 1960s* 

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# Introduction

- •In the first chapter of his most ambitious theoretical work, *The Theory of Political Coalitions*, (1962) American political scientist, William H. Riker was adamantine about his methodological concerns. To him "the main hope for a genuine science of politics lies in the discovery and use of an adequate model of political behavior." (Riker, 1962, p. 9)
- This model was offered by Game theory
- •This paper aims to present Riker's early commitment to formal political analysis, by describing his early life and works, other than the development of formal political models in the 1950s.
- •This intellectual story is framed on the one side by the incipient mathematization of Postwar economics, quickened by the publication of von Neumann and Morgenstern's *Theory of Games and Economic Behaviour*, in 1944.
- •On the other by the pursuit of a similar 'going scientific' path in other social sciences, including Political Science. In political science, the 1950s coincided with the so-called 'Behavioral Revolution'



- •As a political scientist, with strong ideas about what political science needed to become a scientific discipline, Riker did not join the "behavioural revolution"
- •He focused instead on how to extend the "plea for objectivity" in political theory.
- •In doing so, he developed a game theoretical analysis of such political issues like coalitions in politics
- •Furthermore, all the 1950s were characterised by the attempts to extend formal modelling to political issues (not only game theory: see Arrow, 1951; Black, 1958; Downs, 1957)
- •Methodologically: this is an historical work, where Riker's life and works are reconstructed resting both on their content, but also on correspondence, personal papers and interviews (when possible)
- •My paper is so divided: in the first part, I present a reconstruction of Riker's early life; in the second, some models of formal political theory in the 1950s; in the third part, the content of Riker's work about political coalitions; finally, I try to detect how Riker employed economic theory to pursue his analysis.



#### William H. Riker: early life and formation

- Riker was born in Iowa in 1920 and attended
  DePauw University and Harvard Graduate School
- At Harvard he developed hostility toward the mainstream methodology in American PS, namely "case studies" and History of political Ideas
- To him, they lacked the necessary generality to be valid explanations of political behaviour.
- His concerns were shared by the 'behavioural revolution' in PS.
- But Riker never joined it, preferring instead to focus on how to develop a true, i.e. internally consistent, political theory





William H.Riker (1920-1993)



- "I began to think that once you raise the question of what can you do to bring a particular moral position into some sort of effective institutional operation, why you also raise the question of whether or not institutions accomplish what they are intended to accomplish" (Riker, interview with Kenneth Shepsle, 1978)
- The issue to be addressed is: what political science is and can it utter true sentences about political phenomena?
- In vN/M's book Riker found "what I thought that political science needed for constructing theory", namely n-person ZSGames, a "general theory of coalitions".
- Other works which influenced him were: Arrow's and Black's social choice analysis (especially the latter); Shapley and Shubik's power analysis by the general value for n-person games (Shapley Value) (Shubik and Shapley, 1954)
- In 1962 he published the *Theory of Political Coalitions*, heavily resting on vN/M analysis (Stable Set Solution). This work was made up mainly during his fellowship at the CASBS (Stanford) in 1960-1.
- In 1962 Riker obtained his appointment at the University of Rochester (NY), where he established an innovative, theory-driven and mathematical graduate program in Political Science





### Modeling politics in the 1950s

- In the 1950s, alongside the 'going mathematical' process in economics, some attempts to extend the same way of reasoning to other social sciences were carried forward. For political science, these include social choice theory and some applications of game theory.
- First: different names for this approach: "Positive Political Theory" (Riker),"Public Choice", "Pure science of Politics" (Black), "Strict Science of Politics" (Tullock)
- The common feature is: being formal, namely modelling political behaviour as a rational individual choice
- But a difference (in the case of Riker) with mathematical economics (even game theory) is the earlier's clear cut reference to the positive character of his analysis



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- Two main strands of researches:
  - <u>Social Choice</u>: Arrow and Black
  - <u>Game Theory</u> (Cooperative: Power Index; Non-Cooperative: International politics)
- Starting with Arrow: its core argument is the impossibility of collective choices which preserve all individuals' ranking of preferences.
- It was an old problem (voting cycles, Condorcet Paradox) which Arrow restated in a truly axiomatic fashion (namely by Tarski's logic of relations)
- This work went unnoticed in political science.
- Robert Dahl (and Charles Lindblom) referred to it as "a minor difficulty in voting that people with a methematical turn in mind enjoy toying with" (1953)
- Arrow's analysis is normative, i.e. he is not interested in the real-world occurrence of impossibilities in social choices (even if he does not exclude that this topic can be addressed empirically)



- The Scottish economist Duncan Black followed a similar research path, although employing a different, and far less sophisticated, mathematical approach (Black, 1958)
- Black advanced a positive program for the development of a <u>'pure science of politics'</u> based on the "unity of politics and economics" through a general theory of decisions
- Black showed how collective decisions could be reached, in case of single-peaked preferences. Then the simple majority necessarily includes the median voter's preference (this is the <u>Median Voter Theorem</u>)
- Interested in the positive features of his analysis, Black tried also to compute the a-priori expectations of cyclical majorities, stating that the probability to reach a consistent majority decreases with the increase of alternatives to be voted



- In particular this latter aspects captured Riker's attention
- In 1961, when he was a fellow at CASBS, Riker wrote a paper on the APSR reviewing the contributes in social choice theory, starting from Arrow. (cf. Riker, 1961)
- To him the relevance of this analyses can be summed up as follows:
- "If students of political behavior were to discover and explain the range of mechanisms and social conditions leading to that agreement on norms sufficient for a set of single-peaked curves, then political theorists might be able to evaluate such notions as the public interest and the general will on the basis of empirical knowledge, a kind of procedure which is, I regret, almost unprecedented in the study of politics. Even if such a happy outcome is not possible, many spheres of political life can, I am certain, be more perceptively explained than they have been by the use of the theory here reviewed" (Riker, p. 911)
- The third pivotal contribution was Downs' *The Economic Theory of Democracy* (1957) from which the spatial analysis of voting started.



- Turning to game theory:
- This was applied, in places like RAND, as a tool to deal with strategic issues, especially in international relations (Non-cooperative games)
- Thomas Schelling, Morton Kaplan. But they viewed GT exclusively as a tool, to be complemented with other approaches (like System Theory) (Schelling, 1961; Kaplan, 1957)
- Most interestingly, it's the use of it to address political issues like Power, namely the distribution of power in a committee system
- This is the work of Shapley and Shubik, based on Shapley's general solution for *n*-person games (the Shapley value)
- They computed the power of each member of the committee based on his chance of being critical to the success of a winning coalition
- Their analysis is cooperative and not an equilibrium analysis



- The novelty of this approach according to Riker:
- "Most persons who have tried to analyze power have interpreted it as the ability of one person to make another person do something the other would not otherwise do. While I have deep reservations about this (and most other definitions of power [Riker 1962]), it is clear that Shapley's definition is quite different. It involves not the ability to control persons but the ability to control outcomes through being the pivot or the marginal person between winning and losing coalitions: the last added member of a minimal winning coalition." (Riker, 1992, p. 212)
- Some issues:
- first, attempts to verify empirically this index failed (Riker, 1959), new elements must be added (also strategic considerations)
- second, the interesting point is that even this result, as well as Riker's analysis are cooperative GT and not 'non-cooperative', which is today absolutely dominant



#### Theory of Games and Political Coalitions: Riker's 1962 work

- In 1962 Riker published his most ambitious theoretical work, *The Theory of Political Coalitions*
- In the first half of his book, the author argues that political actors will create coalitions just as large as they believe will ensure winning and no larger (the Size Principle)
- In the second half of his book, Riker slightly modified the *n*-person analysis of Von Neumann and Morgenstern into a set partition of the voting members, to describe the dynamics of coalition formations, that is the strategy at the step before a winning coalition is established.
- This was not a mathematical analysis, given the fact that Riker limit himself to adapt vN/M's model of n-PZSG (Characteristic Function Games) to the analysis of political coalitions



The front-cover of TPC (1962)





#### **Riker and Game Theorists in the 1950s**

- Riker was not much in touch with game theorists in the 1950s.
- The GT community was made up mainly by mathematicians, interested in the most abstract developments of it.
- In that community Riker was an outsider, lacking the necessary advanced mathematical capabilities needed to produce new theoretical developments
- Beside, the most crucial reason was the he was advancing his theoretical agenda in advocating GT
- This differed from the 'behavioral revolution' but at the same time was not easy to be integrated into the actual development of GT
- Some insights can be found in the Economists' paper archive (Duke University), especially among Morgenstern's and Shubik's papers



- Indeed, Riker sent the manuscript of TPC to Yale University Press and to Princeton University Press.
- Morgenstern, at Princeton, rebuffed it, with a very harsh judgement. He wrote: "The basic attempt is very laudable and nobody doubts that Game Theory will influence Political Science very considerably, but the execution leaves much to be desired. [...] Even the outline of Game Theory itself is full of misunderstandings and gaps. A reader not acquainted with Game Theory would not understand the exposition, and one already familiar with it would quickly spot the error" (Morgenstern to Hubel, OMP Box 83)
- At Yale, the manuscript was sent for a referee to Shubik. His assessment was generally positive, even if he too advanced some perplexities on part of Riker's formal apparatus.
- In the end, TPC was published by YUP





### **Riker's model: the assumptions**

- Methodologically, Riker adopted the view that science is built on model, with the aim of prediction.
- Models are based on axioms, derived by experiments and observations
- The main obstacle to the scientific study in social sciences are the normative considerations about human affairs, and the complexity of human actions
- The latter point can be solved by addressing in a precise way what an "event" in social science is and how it is related with/caused by another (deductive-nomological approach)
- Finally, even in social sciences cumulation of knowledge is the aim of general research
- Economics, based on individual action, is a model (alongside Psychology). Politics, indeed , defined as an "authoritative allocation of values" (Easton, 1953) embodies individual action and its changes
- Namely, it is not only the study of history, institutions or law, or the description of political systems



- The decision-maker is rational, but rationality is not addressed in the exact terms of preference orderings, instead as a maximising behaviour of the chances of being part of a winning coalition
- In doing so he is close to the positive economics of Milton Friedman: rationality as well as equilibrium are not mathematical features of the models. Instead, people behave *as if* they are rational.
- As market selects rational behaviour, political institutions select and reward maximising behaviour
- therefore, its (verbal) definition of rationality is:
- "Given social situations within certain kinds of decision-making institutions (of which parlor games, the market, elections, and warfare are notable examples) and in which exist two alternative courses of action with differing outcomes in money or power or success, some participants will choose the alternative leading to the larger payoff. Such choice is rational behavior and it will be accepted as definitive while the behavior of participants who do not so choose will not necessarily be so accepted."
- The other condition of his model is the Z-sum condition (although less general than rationality)



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## The size principle

- Riker's work is based on on von Neumann & Morgenstern's model of *n*-person Zero-sum Game, with the substantive (not mathematical) difference that Riker's coalitions are not simply subsets of the general sets of players, but can be also defined in terms of being 'winning', 'blocking' and 'losing' coalitions.
- The most important concepts devised by von Neumann and Morgenstern in the discussion about coalition making are 'characteristic function' and 'imputations'.
- A winning coalition is one larger than some size stated (even arbitrarily) in the rules of the game.
- The smaller the size of a coalition is, the higher its payoff is, as long as this remains a winning coalition



- a statement can be derived from the model: "In n-person, zero-sum games, where side-payments are permitted, where players are rational, and where they have perfect information, only minimum winning coalitions occur"(Riker, cit., p. 32, italics in the text)
- This is the Size Principle. It must be noted that Riker refers to it as a "sociological law", it's not a mathematical theorem
- Three are the main conditions of the principle:
- Rationality
- Side payments
- Perfect information
- In particular to the latter is related another statement: less perfect is the degree of information, greater is the size of winning coalitions.
- In real world, where PI is not attainable, MWC often does not occur.



- To assess it, Riker resorted on American History. To him SP can explain the behavior of parties, and leaders, in many occasions. For instance, why the Democratic Party emerged from the Republican-Democratic Party in the 1830s (Andrew Jackson)
- His argument resembles an 'instrumentalist view':
- "I do not suggest, of course, that these nineteenth-century statesmen appreciated this principle as a law of rational behavior. What I do insist, however, is that it describes their behavior, even though they probably perceived their problems thus: 'With our overwhelming majority, there are so many and so conflicting interests in the party that none can be satisfied. As long as two conflicting interests remain in the party, neither can be satisfied [which, I add, is why a grand coalition is valueless]. For the sake of action for the interest we approve, we shall therefore decide to satisfy one interest, and if others are offended, they may leave the coalition."[...](Riker, cit, pp. 65-6)





#### Strategy and Coalition building

- Introducing Side-payments, the dynamics of coalition-building can be explored. Then, before a MWC is reached, a series of 'proto-coalitions', led by leaders which attract followers by offering side-payments, can be seen
- 'Side payments' are payments in promises on particular policies, or subsequent decisions, up to the threat of reprisal. Besides, these side payments have also costs, which the leader of the coalition itself pays, and that must be taken into account. (Riker, cit., pp. 109-20)
- Most importantly, Riker assumed that side payments were scarce and finite, subject to considerations regarding their economic value.
- The study of dynamic coalition building is important because it involves <u>strategic</u> <u>considerations</u> about the behavior of political actors and the equilibria outcomes and therefore their inner stability.
- But Riker cannot demonstrate that MWC really corresponds to an equilibrium, and if this equilibrium is stable



#### Political Science and economic modeling: some conclusive remarks

- Riker's work was not reviewed by any real game theorist (as seen, he was an outsider in that community)
- This final section aims to explore Riker's use of economic and game-theoretic reasoning, with regard to three aspects: <u>rationality</u>, <u>game theory</u> and <u>equilibrium</u>
- Starting with <u>equilibrium</u>, this is related to how economics changed between 1930s-1950s.
- Giocoli summed up the radical transformations in economics (b/w the 1930s and the 1950s) as two distinct visions of it, namely economics as a "system of forces" and as a "system of relations".
- In the first economics studies equilibrium as a process, in the second instead focuses on the formal properties which characterise it, without saying anything about their meaningfulness for economic analysis.
- Riker saw economics as as a "coherent theory and verified generalizations", the product of "150 years of empirical investigation and refinement of theory". (Riker, cit. p. 6)



- In my view Riker is more close to the first vision of economic (SOF).
- Indeed, equilibrium is not an analytical framework within which formal analysis can be conducted (and neither the solution of a game), but instead a relationship of forces, in a way not different from that of partial equilibrium analysis in economic models. This is apparent when he wrote: "The notion of equilibrium is that of a relationship of forces arranged so that the deviation from some point of balance results in a (possibly automatic) correction back to balance."
- This can also explain why he focused, in the last chapters, on the analysis of the components of the disequilibrium. Indeed, in a 'system of forces' framework, disequilibrium and equilibrium have the same importance. Besides, since it is clear that reality, especially social reality, hardly shows anything similar to 'physical' equilibrium, disequilibrium sometimes has a stronger appeal to the researcher.
- Indeed, when referring to different types of equilibrium in political science, in the first 'Positive Political Theory' textbook, written with Peter Ordeshook he defined his TPC as a 'weak, unique equilibrium', namely a social outcome that is the product of (usually) more complicated interactions toward more complicated goals.





- Let's turn now to <u>rationality</u>
- As seen, he criticized the notion adopted by economists, presenting instead an idea based on the preference for winning over losing
- He adopted a 'summation' argument: even if not all agents are rational, the most important agents are.
- However, what Riker dismissed is that rationality in economics it is a way to constrain the beliefs and desires people are allowed to have, in order to make their action explainable.
- Therefore, even if rationality can describe people's actual behavior, this does not preclude the fact that modeling it requires strong assumptions concerning beliefs, preferences and their formal structure
- There is no contradiction between a purely tautological argument and a positive analysis of concrete human behavior.





- Let's conclude with game theory
- Riker employed von Neumann and Morgenstern's theory in the first part of TPC. However in the second part, he advanced an analysis of how coalitions are formed, using strategic rationality. That is, dynamic analysis vs static analysis.
- In GT, strategic analysis is embodied in Non-cooperative GT, as well as in the attempt, by Nash, to provide Non-cooperative foundations of Cooperative Games ('Nash Program) (Nash, 1953)
- Riker's analysis seems conducted in terms of the same issues that pushed Nash toward his 'NP'. However, Riker's mathematical capabilities to set forth this analysis were too much underdeveloped. Furthermore, the GT notions needed (for instance the extension of NE to extensive games) have not been elaborated yet
- Riker instead foresaw the possible development of GT but was unable to pursue it.