

Wiesław Wójcik, Wojciech Załuski

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Wojciech Załuski,
Game Theory in Jurisprudence, 360 pp.
Kraków: Copernicus Center Press 2013

The Copernicus Center Press publishes numerous valuable books from different disciplines of science. Most of them are part of the research program of the Copernicus Center for Interdisciplinary Studies (the Center was founded by Rev. Prof. Michał Heller in 2008). The purpose of these research projects is to understand how a given problem (social, philosophical, economical, political, etc.) is rooted in science, related to religious, theological or ethical views, and how it originates from philosophical ideas.

The book *Game Theory in Jurisprudence* written by Wojciech Załuski fits into this program in a special way. The book is an attempt at analyzing legal and philosophical concepts through tools and methods of game theory. It needs to be emphasized that, on the one hand, game theory is a branch of rational choice theory (including decision theory and social choice theory), and on the other, it is a branch of mathematics, which studies strategic interactions. The aim of Wojciech Załuski's book is a more general analysis of concepts used in game theory without going into mathematical details.

We know that in the first half of the twentieth century some prominent mathematicians gave mathematical foundations to the “game problem.” The most significant creators of mathematical game theory were: Ernst Zermelo, Emil Borel, Hugo Steinhaus, John von Neumann, and John Nash. They constructed key mathematical concepts and structures, such as: strategy, win strategy, payoff function, dominance, equilibrium, the Minimax Theorem, cooperative game, non-cooperative game, etc. Two observations are of great significance (given, among others, by Steinhaus). Firstly, a mathematical form of procedure was

constructed, possibly after a slight modification, and applied to different cases, for example, game of chance, pursuit, chess game, and fair division. All of them are kinds of games and provide proper strategy to solve a given problem. And secondly, thanks to mathematical means, objective results are received regardless of subjective emotions and resolve of an individual: “the greed, the ignorance, and the envy of the other partners cannot deprive him of the part due to him in his estimation [...]. Even a conspiracy of all other partners with the only aim to wrong him, even against their own interests, could not damage him” (S. Banach, B. Knaster, H. Steinhaus, “The Problem of Fair Division,” *Econometrica* 16 (1948): 102).

That is why game theory can be successfully applied in many areas of both natural and social sciences. Its use is also possible in the case of law and legal philosophy, as Wojciech Załuski shows in his book. In his text we can find many legal-philosophical concepts (and even more, regarding social and ethical sciences) and their analysis through the lens of game theory.

The book consists of three parts and Appendix (360 pages in total). In the first part, we can acquaint ourselves with the foundations of game theory contained in twelve core questions and answers to them; among others, they describe different branches and functions of game theory and explain key terms of non-cooperative games (such as: *dominance*, *Nash equilibrium*, *Rollback equilibrium*, *sequential equilibrium*, *the Minimax Theorem*) and cooperative ones (such as: *the core*, *stable set*). For further consideration, a discussion of bargaining problem requires special attention and presentation of its two solutions: the Nash solution and the Kalai-Smorodinsky solution. Finally, the book describes evolutionary game theory. The author writes: “Unlike classical game theory, which makes strong assumptions regarding agents’ rationality, evolutionary game theory makes in fact no assumptions regarding agents’ rationality” (p. 74). It gives us the opportunity to assess a unique kind of rationality, for example, “rationality (and irrationality) of emotions” (Appendix).

The second part of the book discusses different cases of game theory application in describing and analyzing general issues in jurisprudence. First and foremost, the issue of the nature of law is discussed. Thanks to game theory different collective action problems are precisely described (the paradoxes of “The Prisoner’s Dilemma” and “The Chicken” are recalled) and it is explained in what way they are solved by legal norms. Further, the author analyses three important legal concepts: legal interpretation, legal regulations, and justice. Game theory can distinguish between the admissible and inadmissible meanings of a legal norm and help judges to choose the proper meaning and interpretation of this norm. I think that if we study the nature of regulations, the emergence of fundamental laws is especially important. As far as the concept of justice is concerned, we obtain clarification of the mutual advantage problem and an in-depth analysis of the controversy between utilitarian and Rawlsian justice.

The third part concerns some specific issues in jurisprudence, such as: contract law, tort law, and property law. What seems of particular interest to the author is to show an emerging concept of private property and its legal and institutional regulation on the example of the Hawk-Dove game. However, in the case of contract law the theoretical means turn out to be insufficient and the author notices that there is a need for using more advanced tools of game theory. It is a consequence of making assumptions to avoid mathematical aspects of game theory. But avoiding “mathematical aspects” of a theory, that is, *de facto* mathematical formulas, symbols, and relations causes ambiguity. On the one hand, it does not make sense to dazzle the Reader with mathematical formulas serving only as an illustration. In this case it is better to perform a logical and philosophical analysis and use the obtained results in further research. The author of *Game Theory in Jurisprudence* does directly so and it is done with due diligence. On the other hand, the use of mathematical language should not hinder the understanding of a problem, but rather clarify and illuminate it. However, before mathematization of game theory, it was impossible to see hidden analogies and to solve given problems. Still, it is to some extent possible to use only the results of mathematical analysis and obtain some positive results without using mathematical tools. The very volume being reviewed constitutes a good illustration of this thesis.

In my opinion, the author's selection of examples of the legal theory and practice is sufficient to understand the significance of game theory in explaining different legal concepts and situations. Especially valuable is the use of evolutionary game theory to show the meaning of two terms: *evolutionary stable strategy* and *replicator dynamics*. This theory helps to account for irrational motives in the actions of individuals and can be used for explaining social and cultural evolution. It goes beyond the mechanism of reproductive success treated in biological evolution as the only payoff and it uses a different feedback mechanism. The Nash equilibrium is a kind of evolutionary stable strategy, but the latter has specific meaning. It can be used to choose one of the Nash equilibria and therefore the theory of Nash equilibrium becomes, in a sense, part of the evolutionary game theory.

I recommend the book *Game Theory in Jurisprudence* to lawyers, philosophers of science, and to all those who wish to create bridges between sciences and life, humanities, and social sciences. Thanks to the use of game theory, we can find some deeper rationality in many seemingly irrational situations.

Wiesław Wójcik