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PREFACE

Special issue in honor of Abraham Neyman

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Preface

The *International Journal of Game Theory* is proud to publish a special issue in honor of the contributions of Prof. Abraham Neyman to Game Theory. Abraham Neyman graduated from the Hebrew University of Jerusalem in 1977. His dissertaton, titled "Values of Games with a Continuum of Players", was completed under the supervision of Robert Aumann and was awarded the Aharon Katzir Prize for an Excellent Ph.D. thesis. After graduation he obtained a visiting position at Cornell University, from where he continued on to Berkeley. In 1982 Abraham Neyman joined the Hebrew University of Jerusalem, where he participated in the founding of the Center for the Study of Rationality in 1991. In 1985 he became one of the founders of the Center for Game Theory at Stony Brook University, where he worked for 16 years, in 1989 he was elected as a Fellow of the Econometric Society, and in 1999 he was selected a Charter Member of the Game Theory Society.

Abraham Neyman was the advisor of 12 Ph.D. students. He has thus far published 67 articles and co-edited three books. He has also been the co-organizer of numerous conferences and workshops. He served as the Area Editor for Game Theory in

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Mathematics of Operations Research between 1987 and 1993, and was a member of the editorial board of both *Games and Economic Behavior* and the *International Journal of Game Theory*. At the 2008 World Congress of the Game Theory Society he delivered the inaugural John von Neumann lecture, and in 2014 was elected as the President of the Israeli Chapter of the Game Theory Society.

The first topic to which Abraham Neyman devoted his research was value theory. In Kohlberg and Neyman (1981a), he proved the existence of an asymptotic value for weighted majority games with a non-atomic continuum of players. The proof was facilitated by his fundamental contribution to renewal theory (Neyman 1982). In a subsequent work Abraham Neyman proved that the non-atomicity assumption can be relaxed, while other assumptions are essential (Neyman 1988). He also established diagonality of continuous values, which had implications on further developments of the theory (Neyman 1977). Together with Pradeep Dubey and Robert Weber, Abraham Neyman laid an axiomatic foundation to the theory of semivalues, and demonstrated its importance in political economy (Dubey et al. 1981; Neyman 1984a). Also with Pradeep Dubey, he characterized the well-known equivalence principle that is embodied by the value correspondence, a fundamental notion in economics with origins already in Edgeworth's work (Dubey and Neyman 1984, 1994b). In loose terms, it states that in a large economy consisting of many economically insignificant agents, the core of the economy coincides with the perfectly competitive outcomes, which in the case of differentiable preferences is a unique element, namely the Aumann–Shapley value. His other major contribution was the introduction of the Neyman value, a far-reaching generalization of the Aumann–Shapley value to the case of non-differentiable vector measure games (Neyman 2001).

Abraham Neyman's interest in stochastic games was spurred when he attended a workshop at CORE in the winter of 1978–1979, and he commenced his work on the subject with Jean-François Mertens. Together they introduced the concept of the value in stochastic games, and solved one of the main open problems in game theory of the period, namely, the existence of the value in two-player zero-sum stochastic games with finitely many states and actions, (Mertens and Neyman 1981a). He then extended this result for the minmax value and maxmin value in multiplayer stochastic games (Neyman 2003a). Together with Elon Kohlberg he applied operator techniques to study convergence properties of the discounted and finite stage values (Kohlberg and Neyman 1981a). Recently, Abraham Neyman proved the existence of uniform equilibria in multiplayer continuous-time stochastic games, and studied the relation between these equilibria and equilibria of discrete-time approximations of the game (Neyman 2012b, 2013b). Together with Sylvain Sorin, Abraham Neyman studied repeated games with public uncertain duration (Neyman 2003b; Neyman and Sorin 2010; Mertens and Neyman 1981a) and linked equilibria in absorbing games to equilibria in repeated games with symmetric incomplete information Neyman and Sorin (1997, 1998), thereby generalizing previous results regarding zero-sum games.

Abraham Neyman is one of the pioneers in the study of repeated games with boundedly rational players. He modelled boundedly rational players by automata, where the size of the automaton that a player uses measures the complexity of the player. In Neyman (1985, 1999) he studied the finitely repeated Prisoner's Dilemma played by finite automata, and showed that the restriction of the players to strategies with bounded

complexity leads to a folk theorem. He later extended this result to general two-player games, and showed that as the length of the game increases, the limit set of Nash equilibrium payoffs, when the players are constrained to use strategies that are implemented by finite automata, is the set of all feasible and individually rational payoffs, provided the size of the automata that the players can use is subexponential in the length of the game (Neyman 1998). ln Neyman and Okada (1999, 2000a) Abraham Neyman and Daijiro Okada presented the notion of strategic entropy and studied the asymptotic behavior of the value of repeated games with finite automata and bounded recall. Together with Olivier Gossner and Penélope Hernández, Abraham Neyman used tools from information theory to characterize the set of equilibrium payoffs in repeated games with asymmetric information on a stream of states of nature in which actions are payoff relevant and serve as a communication device (Gossner et al. 2006).

His work in Game Theory led Abraham Neyman to study various topics in probability theory and functional analysis, such as renewal theory Neyman (1982), vector measures Neyman (1981b), maximal variation of martingales Neyman (2013a), and nonexpansive mappings (Kohlberg and Neyman 1981a, b, 1999).

In retrospect, the work of Abraham Neyman was fundamental to the progress of research in value theory, stochastic games, and repeated games and complexity. A case in point is the ongoing study of the uniform equilibrium and uniform correlated equilibrium in multiplayer stochastic games, which is based on his seminal work with Jean-François Mertens (Mertens and Neyman 1981a).

The majority of articles in the special issue reflect the research interests of Abraham Neyman and have strong links to his works. However, the issue is diverse in scope, as we aimed to accommodate all significant contributions, in particular those of his former students and co-authors.

Olivier Gossner, Ori Haimanko, and Eilon Solan

1 Appendix

1.1 (I) Books

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