

Von Neumann, Morgenstern, and  
the Creation of Game Theory

*From Chess to Social Science, 1900–1960*

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## Introduction

Game theory, it may reasonably be claimed, has proved to be one of the more significant scientific contributions of the twentieth century. Albeit haltingly and unevenly, and in a manner quite unforeseeable in 1944 when the *Theory of Games and Economic Behavior* was published, it has affected not only economics and political science but also evolutionary biology, ethics, and philosophy proper. Within economics, particular areas such as microeconomic theory, industrial organisation, international trade, and experimental economics have all been reshaped under the theory's influence. Although game theory initially came from outside as a critical contribution, it has now been completely embraced by the economics discipline, as indicated by the awarding of the Nobel Memorial Prize in Economics to John Nash, John Harsányi, and Reinhard Selten in 1994, and to Robert Aumann and Thomas Schelling in 2005.

Various aspects of this development have received the attention of historians of economics and others. In 1992, under the editorship of Roy Weintraub, an exploratory set of essays titled *Towards a History of Game Theory* featured both historical accounts and reminiscences. Building upon their contribution to that volume, a 1996 book by Robert Dimand and MaryAnn Dimand provided a historical survey of the various game-theoretic contributions in the first half of the century. In his 2003 monograph on the evolution of economic rationality, Nicola Giocoli devotes considerable attention to game theory, particularly as it affected the neo-classical conception of the economic agent. A similar theme, treated differently, is central to Philip Mirowski's *Machine Dreams* of 2002, which casts the history of game theory as part of the rise of "cyborg" thinking, linked in an essential manner to von Neumann's work on computing and automata.

With the appearance in 1998 of Sylvia Nasar's biography of John Nash, *A Beautiful Mind*, and its subsequent adaptation as a Hollywood film, the

Ability notwithstanding, his undergraduate career was undistinguished, and in later recollections he was somewhat dismissive of the period, singling out only a class taken with logician Willard van Orman Quine: "[T]hat influenced me a great deal because here was a person who was talking exactly, correctly saying things – the whole idea of mathematical logic – that was a big memory from my Harvard courses" (*ibid*). Shapley was glad to get out of university, being uninterested in further study, without particular ambitions for the future, and keen, one senses, to get away from the East Coast.

Through the Air Force connections of an older brother, who worked at the Budget Bureau in Washington, Shapley was put in touch with Project RAND, a new military research organisation then being developed at the Douglas Aircraft Company in Santa Monica. In 1948, he was recruited to RAND's mathematics division, which was then labelled the section for the "Evaluation of Military Worth". When it came to his gaining the security clearance required of all RAND employees, there was initially resistance – "I had relatives" – but, in time, the Federal Bureau of Investigation was able to determine that Shapley's suitability was not compromised by blood ties. He survived "de-contamination", and entered the inner circle. By early 1950, several months after confirmation of controlled atomic explosions in the Soviet interior, the son was sunk deep in game-theoretic models of nuclear conflict, while the father figured high on McCarthy's list of academics suspected of un-American activities.

From that point on, until its peak in mid-decade, McCarthyism infused American academic life with mistrust and suspicion.<sup>5</sup> Careers were cut short, individuals felt obliged to prove their political loyalties, and university administrations were drawn into battles to defend their faculty members. There were nervous breakdowns, and persecution by the F.B.I. disrupted family lives. The perception of external threat to American society bred a domestic paranoia, with fears of physical fracture being accompanied by fears for the cohesion of the body politic.

RAND was at the centre of this. Its *raison d'être* was bound up with matters of vulnerability and integrity. It was set up because of the likelihood of a bombing campaign against the USSR, and matured with the recognition of a Soviet nuclear threat against the United States. These considerations permeated the culture of the institution and the orientation of its research.

RAND's scientists focused on the vulnerability and integrity of physical structures. Physicists such as the Latter brothers considered the destructive

capacities of atomic bombs, while engineer Bruno Augenstein examined the permeability of various construction materials in the face of gamma rays, and his colleague Ted Barlow worked on the development of early warning systems to protect the U.S. territory against the arrival of Soviet bombers.

RAND social science gave full expression to a topical concern for individual behaviour and social integrity. Questions of individual rationality and group cohesion underscored the wargames as well as the experiments in game theory, psychology, and group dynamics, conducted by RAND researchers under Williams.<sup>6</sup> Together they formed a constellation of interconnected theories and practices – a "form of life" to use the sociological expression – broadly concerned with individual rationality and social order at a time of threat. The alertness and predictive abilities of soldiers were tested; students and RAND staff were invited to participate in group experiments to see whether they were rational in the game-theoretic sense; groups of Air Force personnel were observed as they carried out simulated air-defence under induced psychological stress; and RAND mathematicians and other researchers engaged in simulated conflicts over the war map.

Normative stipulations concerning normal behaviour abounded, not only in the experimental procedures themselves, but also at various removes from them. At the seminar with which we opened this chapter, the doors were closed and guarded, open to those with security clearance. In experiments conducted, John Nash humorously, but tellingly, spoke about his subjects being remarkably well-behaved, and John Williams, as experimental subject himself, laughingly referred to the psychological instability of his opponent, Armen Alchian. More seriously, the same Williams, as research director, encouraged interdisciplinary mixing at RAND in the promotion of scientific creativity, yet in 1951 deemed game theorist J. C. C. McKinsey a risk because of his homosexuality. Three years later,

<sup>6</sup> Note that the focus here is not RAND economics, which involves the story of Hitch's economists, and how cost-benefit analysis became important at RAND, underpinning systems analysis and, ultimately, the phenomenon of the "Whiz Kids" under McNamara at the Pentagon. Nor is the focus RAND's Social Science division under Hans Speier. This group, which soon included Russian scholar Nathan Leites, and sociologists Fritz Sallagar and Paul Kecksméti – the Hungarian encountered earlier who had reviewed Menger's 1934 book – took a literary-historical approach to social analysis (see, for example, Leites' work on the Politburo, or Kecksméti's "Sociological Aspects of the Information Process" [RAND P-430]). In time, this alienated them somewhat from the dominant culture at RAND, which variously privileged the formal models of the game theorists and the quantitative cost-benefit studies of the economists. Speier's unit soon shifted from Santa Monica to RAND's Washington, D.C. office.

<sup>5</sup> See Halberstam (1993).