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MORGENSTERN, OSKAR

(*b*. Görlitz, Germany, 24 January 1902; *d*. Princeton, New Jersey, July 26, 1977),

economics, forecasting, theory of games, defense economics, accuracy of observations.

Morgenstern was one of the two founders of the theory of games, along with John von Neumann. This seminal work provided the social sciences with the precise mathematical tools to describe strategic decision-making. He is also known for his early work on economic forecasting and on the limits of economic behavior.

Morgenstern was trained as a member of the Austrian school of economics but was far more open to new ideas than were most of its members. It was founded by Karl Menger as a school of economic thought stressing individualism. He received the degree of Doctor Rer. Pol. from the University of Vienna in 1925. With a Laura Spellman Rockefeller Fellowship, he subsequently studied at the Universities of London, Paris, and Rome, and then at Harvard University in Cambridge, Massachusetts, and Columbia University in New York City. He later noted that one of his important memories of this time was a visit to Francis Edgeworth shortly before he died. Edgeworth was one of his heroes and a precursor to the invention of cooperative game theory.

In 1929 Morgenstern returned to the University of Vienna as a privatdozent. Two years later he succeeded Friedrich Hayek as director of the Austrian Institute for Business Cycle Research in Vienna, where he concentrated on the study of speculation and economic prediction and employed Abraham Wald at the institute. Morgenstern had a great eye for talent and was willing to hire Wald, an unknown, poor Rumanian Jew whose talents in the application of mathematics to economics and statistics soon became apparent. In 1935 Morgenstern became a professor of economics at the University of Vienna. He was also a participant in Karl Menger's

influential Vienna Circle. Morgenstern was an advisor to the Austrian National Bank from 1932 to 1938 and to the Ministry of Commerce from 1936 to 1938. In 1936 he became a member of the Committee of Statistical Experts of the League of Nations.

Princeton and Game Theory . Although not Jewish, Morgenstern in 1938 was deemed to be politically unacceptable, and he therefore left Austria for the United States, where he was appointed as a lecturer in economics at Princeton University in New Jersey. He became an associate professor in 1941 and a full professor in 1944, the year he became a U.S. citizen.

Morgenstern's 1935 article, "Perfect Foresight and Economic Equilibrium," prompted the mathematician Edward Cech to have him look at the 1928 article by John von Neumann on two-person zero-sum games. How one predicts the behavior of others and how this influences one's own behavior is critical to game theory analysis and to economic forecasting. The von Neumann article offered a formalization of this idea. He finally met von Neumann in Princeton, where they became good friends as well as colleagues. Together, they wrote *Theory of Games and Economic Behavior* (1944), which not only launched game theory but provided the basis for the theory of choice under uncertainty.

In the best sense of the term, Morgenstern must be regarded as a great entrepreneur in the development of economics in general and game theory in particular. There has always been considerable skepticism concerning his role in the development of game theory. An unverified story has a mathematician ask von Neumann, "What was Oskar Morgenstern's contribution to the Theory of Games?" Von Neumann is said to have replied: "Without Oskar, I would have never written the *Theory of Games and Economic Behavior*." This anecdote appears to reflect the fact that although Morgenstern's mathematical abilities were quite limited, when he recognized an important idea that could be mathematized, he persisted in finding mathematical collaboration.

Other Activities . In 1948 he headed up the Econometrics Research Program at Princeton, sponsored primarily by the U.S. Office of Naval Research. Morgenstern was a founder of both the *Naval Research Logistics Quarterly* and the *International Journal of Game Theory*. He was deeply concerned with application as well as with theory, which led him to help found a highly successful consulting group known as Mathematica, Inc.

Morgenstern also wrote an influential book, *On the Accuracy of Economic Observations* (1950); this work reflected his strong feelings about the use of misplaced accuracy in economics. Morgenstern continued working on a variety of themes, notably promoting and extending the von Neumann multi-sector growth model in "A Generalization of the von Neumann Model of an Expanding Economy" (1956), with John G. Kemeny and Gerald L. Thompson. He also wrote on national defense and on finance, in particular the testing of the emerging random walk hypothesis in *Predictability of Stock Market Process* (1970), with Clive W. J. Granger.

Assessments of Morgenstern's Contributions . The reception of Morgenstern and von Neumann's book on the theory of games was mixed, and it took many years for it to work its way into mainstream economics, despite some favorable early reviews. For example, an instance of lordly disregard is attributed to Joseph Schumpeter, who supposedly remarked that the *Theory of Games and Economic Behavior* was written by a mathematician who knew no economics and an economist who knew nothing whatsoever. Another, verified comment on Morgenstern's contributions was made by Richard Bellman. In reply to a question about what Morgenstern's contributions to economics were, Bellman replied, "Wald and von Neumann." In fact, if all that Morgenstern had done was to be the catalyst to get Wald and von Neumann to work on basic problems in economics, that would have been considerably more than most economists accomplish in a lifetime.

Outside the L'Académie française (French National Academy), whose membership is limited to forty, is a statue, referred to as the forty-first chair. It serves to remind all that national academies and prizes are not merely the product of the institutions of the society but are operated by committees whose bias is toward safety and peer acceptance. Morgenstern had

all of the characteristics destined for a forty-first chair. His mathematics were poor and his methodology was weak, but against this his imagination was considerable and his ability to select large problems and to spot and promote unconventional talent was great. He would have honored the Nobel Prize.

It has been observed that progress in science proceeds from funeral to funeral. Neither Morgenstern nor von Neumann lived long enough to see the enormous impact of the theory of games. Too many people had to die before the profession as a whole was able to accept the depth of the sea change that had taken place. In the early twenty-first century this change combined with a far deeper understanding of networks and information. The overall change proceeded at a faster pace, but the start-up costs were considerable. Jacob Viner, a distinguished economist at Princeton and a contemporary of Morgenstern, commented that he could not see how game theory could be of any use whatsoever in economics when it could not even solve chess, which was so much simpler than any economic problem. The point that the scientific

underpinnings of economics were being developed painstakingly was completely missed by most of the faculty at Princeton (and elsewhere) at that time.

Much of the theory of games changed the nature of the use of mathematics and logic in the social sciences. Combinatorics became important. The development of the axioms for a utility function defined up to a linear transformation set the stage for many further applications of the axiomatic method to problems in economic theory.

Observations on the speed of progress and change are not unique to the theory of games in the development of economic theory. The great work of Antoine Cournot, *Recherches sur les principes mathématiques de la théorie des richesses* (1838; *Researches on the Mathematical Principles of the Theory of Wealth*, 1963), was essentially ignored for many years and then subject to attack by the mathematician Joseph Bertrand. The misunderstanding of Bertrand, however, can be cleared up easily by using the modern theory of games. Cournot had chosen quantity as a strategic variable. Bertrand argued that price was more natural. Either or both would produce reasonable economic models. New approaches are easy to misinterpret or to ignore.

Cournot's work, the great precursor of games in strategic form solved for their noncooperative equilibria, spent far longer a time in purgatory than did the *Theory of Games and Economic Behavior*

The great precursor to cooperative game theory was Edgeworth's *Mathematical Psychics* (1881). This, too, hardly swept the fields of economic thought for many years. But as is well known in 2007, the glimmerings of the combinatorics of cooperative game theory and the concept of the core were already in this book.

Morgenstern, Cournot, Edgeworth, and von Neumann all lived comfortable upper-middle- to upper-class lives. Von Neumann, the mathematician, was phenomenal, and his work was primarily in areas where the collegial perception of the importance of new work is almost instantaneous. Therefore, his recognition as a major figure in applied mathematics came nearly immediately. Even without the theory of games, his career would have been deemed extraordinary. However, the three economists— Morgenstern, Cournot, and Edgeworth—had to face a different context for academic judgment. Full understanding of the impact of their

work came slowly. None of them lived long enough to hear popular accolades; all of them, though, managed to survive long enough to receive the positive feedback that counted. That was the recognition of a handful of peers whose opinions they respected.

The success of game theory since the 1950s and 1960s has far outstripped the expectations in the of even the most optimistic of game theorists of those decades. Game theory has evolved into an independent academic subject with insights particularly in the social sciences, but also in biology, computer science, and mathematics. It will play a role in the overall development of a viable theory of organization. Oskar Morgenstern did not live to see its immense spread and acceptance, but his vision and ability to understand what he and von Neumann had started was considerable.

The acceptance of new ideas is often slow. The development of science is a social process. The individual professionals all come with highly different personalities. There does not appear to be any ideal. Some would welcome the thought that great productivity, intelligence, and originality would be accompanied with generosity and social graces. There is, unfortunately, little evidence that these various gifts are highly correlated.

Morgenstern's Virtues . Morgenstern combined reasonably superior conventional intelligence with great drive, great originality, and skepticism, together with honesty and intrinsic decency. He was highly sensitive to the realities of his environment and not overly upset about what to others might appear a hostile climate. Although Morgenstern had a fair number of students, he did not actively construct a school, as others have done. Yet many of his students, and even the short-term visitors to his research projects, can look back and recognize that knowledge and understanding are moved forward in many different ways. Many of them also may recollect that he was concerned that their own professional careers not be damaged by their trust in working for an individual who did not stand in the center of the current profession but was gambling on the shape of the horizon.

The laserlike intellect of a von Neumann is direct and overwhelming. But Morgenstern's curiosity, application, insight, and willingness to be many miles ahead of the troops in unexplored territory enabled him to provide von Neumann with direction, motivation, and insight in application of game theory to economics that the latter might not have otherwise obtained.

Possibly the descriptor that best sums up Oskar Morgenstern's insight and skills comes from a Spanish word as used in Argentina. It is *rastrodero*, which can be translated as "pathfinder" or "tracker." The translation does not, however, do justice to the full meaning, which implies being alone in the wilderness, yet having enough experience and self-sufficiency to be comfortable in the unknown.

Morgenstern's personality combined a veneer of Germanic "Herr Professor" formalism with a sense of humor and personal concern for his students. In the study at his elegant home at Princeton was a portrait of the last king of Saxony, whom, he noted was his grandfather. He died of cancer in Princeton in 1977, survived by his wife, Dorothy (née Young), whom he married in 1948, and their two children, Karl and Karen.

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