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LEADERS & SUCCESS
John Von Neumann, The Economic Revolutionary Add It Up: His math set strategy for business competitors

RICHARD MATURI
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While many young Hungarians reveled in soccer and pranks, John von Neumann grew up in the realm of the child prodigy.

By age 6, he could divide eight-digit numbers in his head.

Two years later, at age 8, the boy who back then went by Neumann Janos Lajos spent his time solving differential and integral calculus problems.

He mastered several languages, becoming fluent in Latin and ancient Greek by age 9.

Von Neumann (1903-57) would use his genius at mathematics to create new ways of approaching economic and business decisions.

And his game theories put math to work solving business problems and creating strategies based on the interaction of competitors.

Von Neumann benefited from a nurturing Hungarian educational system that produced generations of exceptional scientists, writers, artists and musicians.

Sharp Kid

When Gabriel Szego, a Budapest University professor of mathematics and von Neumann's first tutor, returned home from his first encounter with the kid, he broke into tears due to the boy's brilliance.

Von Neumann's formal schooling began at the Lutheran School in Budapest in 1914. He spent two years at the University of Berlin, then graduated from a technical school in Zurich with a chemical engineering degree. He simultaneously obtained a doctoral degree in math from Budapest University.

By the end of 1929, von Neumann had published 32 major papers on mathematics, including his groundbreaking 1928 theory of games.

He married Mariette Kovesi on New Year's Day 1930 in Budapest. They emigrated to America to escape the rising Nazis. Von Neumann then accepted a lectureship in mathematical physics at Princeton University in New Jersey.

The von Neumanns had a daughter, Marina, in 1935, but divorced in 1937, the year he received his naturalization papers. He married a second time, in 1938, to another Hungarian, Klara Dan.

Along with Albert Einstein, von Neumann accepted a post at Princeton's Institute for Advanced Study in 1933. He stayed there until 1955, producing 75 papers in those two decades. While his major contributions to math, physics, quantum mechanics, meteorology and biology changed the scientific world, his early work on computing, linear programming, economic theory and game theory transformed business forecasting and strategies.

Take Southwest Airlines (LUV). It uses economic forecasting models to figure the direction of oil prices. If jet fuel costs skyrocket, the firm may purchase additional stocks of fuel or commodity futures contracts to protect itself.

Such strategies can help Southwest protect against volatile fuel prices and stabilize earnings.

Economic Horizon

If one airline cuts prices dramatically and another follows suit to maintain market share, they all lose revenue and profits. Game theory helps companies choose optimum pricing policies, taking into consideration possible competitor actions or counteractions.

The ultimate goal of economic forecasting and game theory is to create the most efficient organization, leading to greater profit.

Norman MacRae wrote in "John von Neumann: The Scientific Genius Who Pioneered the Modern Computer, Game Theory, Nuclear Deterrence and Much More": "He pounced with lion's claws on the new mathematical ideas of other people that did look interesting, and he pummeled them into a shape that was more precise."

"Before von Neumann, mathematics did not play a factor in economics; he revolutionized the whole field. His impact cannot be overestimated," Nick Barron, a math and statistics professor at Loyola University, Chicago, and author of "Game Theory," told IBD.

"Likewise," he added, "von Neumann's game theory is taught worldwide, and just about every corporate leader worldwide has been exposed to it. It is used every day in option trading, allocation of resources, pricing, optimal scheduling and many other business applications."

Safety Net

Von Neumann's 1928 two-person, zero-sum, minimax game theorem sought to contain the worst possible result. In a zero-sum situation, one player's gain is equal to the other person's loss.

That original theory sought to minimize the maximum possible loss. Hence, the term minimax.

Since the world is more complex than two-person scenarios, von Neumann joined forces with Oscar Morgenstern to write "Theory of Games and Economic Behavior."

The 1944 book takes into consideration many more possibilities and players.

"While game theory has evolved from Neumann's original simple two-player model, he provided the framework for corporate management to make more informed decisions," said Michael Cata, strategist for the consulting firm Undercurrent in New York City.

Von Neumann's mathematical programming and computer science endeavors proved a major contributor in the design of the first electronic computers.

In 1945 he wrote a document called "The First Draft of a Report on the EDVAC (electronic discrete variable automatic computer)."

It detailed principles for an electronic stored-program computer. Using his matrix games as a base, von Neumann expanded on others' linear programming theories to achieve the best possible outcome.

Later, his "Expanding Economy Model" explained how goods can be produced at the lowest price and the greatest quantity.

"Neumann's economic and game theories provided understanding of competing options and the interaction between players," said Usha Haley, a professor of management at West Virginia University. "Yet companies need to be cautious when using simple models in dealing with complex problems. The simplicity of models is not always realistic."

Von Neumann was also in the thick of war strategy.

He was a key player in the Manhattan Project, which produced the atomic bomb that ended World War II. And his MAD (mutually assured destruction) idea — developed as an offshoot from his game theory — helped keep the peace in Europe during the Cold War.

"Coupled with his sheer genius, his political savvy enabled him to stay on good terms with both sides on crucial issues," said his daughter, Marina von Neumann Whitman.

The influence of her father is reflected in her own career as a member of the Council of Economic Advisors to President Nixon, chief economist at General Motors (GM) and currently professor of business administration and public policy at the University of Michigan.

Her father drew many honors:

• The University of Maryland-based Institute for Operations Research & the Management Sciences created the annual John von Neumann Theory Prize.

• The New York City-based Institute of Electrical & Electronics Engineers annually awards a John von Neumann Medal for outstanding achievements in computer-related science and technology.

• The John von Neumann Award of the Rajk Laszlo College for Advanced Studies in Budapest, Hungary, honors professors with top contributions to social sciences.

• The Society for Industrial & Applied Mathematics in Philadelphia gives an annual John von Neumann lecture.

• President Eisenhower appointed von Neumann to the Atomic Energy Commission in 1955.

• Eisenhower presented him with the Presidential Medal of Freedom in 1956.

• The American Mathematical Society presented a symposium on von Neumann's legacy in 1988.

• The U.S. Postal Service released a 2005 von Neumann stamp as part of its American Scientists commemorative series.

• These were named in his honor:The von Neumann crater on the moon. The John von Neumann Center in Plainsboro Township, N.J. The John von Neumann Computer Society in Budapest.

"Neumann was one of the most creative mathematicians of the 20th century," said Barron. "In a century with many geniuses and many breakthroughs, von Neumann contributed more than his fair share. He ranks among the greatest mathematicians of all time for his depth, breadth and scope of contributions. There was hardly any subject that came to his attention that he didn't revolutionize."

Von Neumann died at 53 of cancer.

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