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The Life John Von Neumann

Introduction

John von Neuman was a well-respected mathematician and physicist who lived during the early to mid-1900s. He was born and raised in Budapest Hungary. Throughout his life, he was regarded as one of the most influential figures in both mathematics and computer science. Today, his work has impacted the development of computer science and game theory. Despite his many achievements, Von Neumann was not only a brilliant man but a complex induvial in which he had influenced many people in his lifetime.

Early Life

Neumann was born in Budapest, Hungry in 1903. His mother was Margit Kann a housewife and his father, Miksa Neumann, was a banker with a law degree. Throughout his childhood, he was passionate about mathematics. At a young age, he was able to memorize a randomly selected list of names, addresses, and numbers from the phone book. At the age of 15, he started attending lectures at university and got accepted 3 years later to attend the University of Berlin to study chemistry. A few years later he went to the Swiss Federal Institute of Technology in 1925 to gain his degree in chemical engineering and a year later he received his doctorate in Mathematics.

Personal Life

Von Neuman was married twice. He was married to Marietta Kövesi and then later married Klára Dan. In his first marriage, he had one child named Marina. He had met his wife while studying at university. He later got divorced and married Klára Dan. He met his newly beloved wife when she was a physics student and was a friend of his ex-wife. They had one child together.

Throughout his life, he would lecture in many places. He lectured in Berlin from 1926 to 1929 and went on to lecture in Hamburg from 1929 to 1930. He would later move to the United States of America to lecture a Princeton.

Contributions to Mathematics

John von Neumann was one of the greatest minds in the field of mathematics, making many different contributions to several different areas of the field. One of the most important contributions was his work in the field of functional analysis. His work on the study of infinite-dimensional vector spaces lead to the theory of operator algebras which is used in linear operators.

The theory of operator algebras has many different applications in modern physics such as quantum mechanics, statistical mechanics, and signal processing. Specifically, the work he had contributed on operator algebra helped lay the foundations for the study of quantum mechanics.

Another important contribution Von Neumann made to mathematics was the development of von Neuman Algebra. Von Neumann algebra is a type of operator algebra that is used to study the algebraic properties of different systems of linear operators. The use of this math is mostly used for the use in quantum mechanics.

In addition to his work in Neuman algebra, he made significant strides in Game theory. Game theory is the mathematical study of decision-making in situations where multiple players have different interests. He tried using his mathematical knowledge to apply a mathematical model to analyze decision-making. These models not only helped in understanding the different decision-making tactics of humans but also in economics and military strategy.

His mathematical formulas for decision-making would be later known as the minimax theorem. This theorem provides a sort of framework analyzing situations where multiple people are making decisions while trying to get the most amount of profit out of the situation while trying to lose as little as possible. These theories are still used today in many of the problems that society has.

John Von Neumann was a part of the Manhattan Project. The project was a research project by the military, where they were trying to develop the first nuclear weapons. His contribution was creating mathematical models and computer models for the weapon to determine how the weapon would react in different circumstances.

Contributions to Computer Science

John von Neumann was not only known for his contributions to the field of mathematics, but he also made many significant contributions to the field of computer science. He was one of the first people to help develop the first electronic computer known as the Electronic Numerical Integrator and Computer also known as (ENIAC). This machine was designed to calculate different mathematical formulas for the United States Army During World War II. The main purpose of this machine was to decrypt details of war from the enemy. His contribution to the Electronic Numerical Integrator and Computer was to design the central processing unit. The central processing unit or CPU had stored programs on it in memory and was executed automatically. Before Von Neumann’s new method of storing programs in memory, computers had to be reprogrammed manually for different tasks every time the computer had a new task. This simplified the process of programming and was a steppingstone to building more complex and versatile computers.

His work on computer architecture led to the development of Von Neumann's architecture, which is still used today for most computer systems. The Von Neumann architecture consists of a single shared memory space for programs, data, and instructions. This allows for more efficient processing speeds and helps with efficiency with modern computers today.

Not only was Von Neumann able to work on computer hardware, but he also played a key role in developing the software for the computers that are known today. He developed a concept of self-replicating automata. These self-replicating automata are mathematical formulas that can replicate themselves. These basic mathematical formulas are used in many different programs like A. I and viruses.

Conclusion

Unfortunately, John Von Neuman died on February 8th, 1957, at the young age of 53. He was diagnosed with either bone, pancreatic, or prostate cancer. The fields of mathematics, computer science, and cryptography all benefited from the efforts of renowned mathematician and physicist John von Neumann. The world we live in today has been significantly influenced by von Neumann's contributions. His work will surely continue to influence these fields' destiny for many years to come, and his legacy continues to inspire mathematicians and computer scientists across the world.

Citations:

Britannica, The Editors of Encyclopedia. “John von Neumann.” Encyclopedia Britannica,

Encyclopedia Britannica, Inc., 6 Oct. 2021, <https://www.britannica.com/biography/John->von-Neumann/Princeton-1930-42.

Institute for Advanced Study. “John von Neumann.” Institute for Advanced Study, n.d.,

<https://www.ias.edu/von-neumann#:~:text=Two%20years%20later%2C%20he%20went,a%20thesis%20on%20set%20theory>.

MacTutor History of Mathematics archive. “John von Neumann.” The University of St Andrews,

May 2001, <https://mathshistory.st-andrews.ac.uk/Biographies/Von_Neumann/>.

"John von Neumann." Atomic Heritage Foundation, 2022,

<https://ahf.nuclearmuseum.org/ahf/profile/john-vonneumann/#:~:text=Von%20Neumann's%20principal%20contribution%20to,targets%20for%20the%20atomic%20bomb>.