

Nobel Prize in Economics — Part 1: John Nash, the Genius of Equilibrium

by Max Farrington and Michael Hirsch — updated edition 2025–2026

John Forbes Nash and his wife Alicia both died on May 23, 2015, in a taxi accident in New Jersey while returning from Norway, where Nash had just received the Abel Prize—the highest distinction in mathematics. It was a tragic end for one of the most brilliant and troubled minds of the twentieth century, whose work continues, ten years after his death, to influence economics, diplomacy, artificial intelligence, and many other fields.

In tribute to Nash and his work, this episode of EconoMag focuses on his legacy and on the Nobel Prize in Economics he received in 1994, jointly with János Harsányi and Reinhard Selten.

The Early Years of John Nash

John Nash was born on June 13, 1928, in Bluefield, West Virginia. His father was an electrical engineer and his mother a Latin teacher. His passion for mathematics began at the age of fourteen when he read *Men of Mathematics* by E. T. Bell.

At first, Nash studied chemical engineering before ultimately devoting himself entirely to mathematics.

In 1948, he earned both a Bachelor's and a Master's degree from the Carnegie Institute of Technology—now Carnegie Mellon University. One of his professors, Richard Duffin, famously wrote in his recommendation letter: "This man is a genius."

Nash chose Princeton over Harvard after being offered the John S. Kennedy Fellowship. It was there that he would make his greatest scientific contribution.

The Nash Equilibrium: A Revolutionary Concept

In 1950, in just twenty-seven pages, Nash completed his doctoral dissertation on non-cooperative games. This work defined what would become known as the Nash equilibrium, one of the most powerful concepts in twentieth-century economic thought.

Game theory provides a formal framework for analyzing strategic interactions between multiple decision-makers. It studies situations in which the choices of one agent influence the actions and reactions of others.

In a Nash equilibrium, each player correctly anticipates the strategies of the others and chooses the best possible strategy given those expectations.

To illustrate the concept, economists often use the famous Prisoner's Dilemma.

Two prisoners are questioned in separate rooms. If one betrays the other, he goes free while his accomplice receives twenty years in prison. If both betray each other, they each receive ten years. If neither speaks, they each receive one year.

At the Nash equilibrium, both prisoners betray each other—even though this outcome is collectively worse—because without the possibility of cooperation, each seeks to minimize personal risk.

This example illustrates a fundamental paradox: a Nash equilibrium is not necessarily a socially optimal outcome. That is precisely why the concept is so useful for understanding market failures, trade wars, or international climate negotiations.

Applications Across Many Fields

The Nash equilibrium has countless applications in economics today, particularly in analyzing firm behavior in duopolies and oligopolies, or in studying auction mechanisms used in public procurement.

Its applications extend beyond economics to geopolitics, such as the analysis of nuclear deterrence during the Cuban Missile Crisis, and more generally to any situation involving strategic decision-making.

Nash's work also has profound implications for public policy, diplomacy, and the design of sophisticated algorithms used in technology and logistics.

In the digital sector, where cooperation and competition often coexist, Nash's theoretical framework can help optimize the behavior of algorithms interacting in real time. With advances in artificial intelligence and big data, entirely new strategic equilibria may emerge—sometimes producing unexpected outcomes.

The Nobel Committee has recognized game theory on several occasions:

- in 1994 with Nash, Selten, and Harsányi
- in 2005 with Thomas Schelling and Robert Aumann
- and in 2007 with Leonid Hurwicz, Eric Maskin, and Roger Myerson

This repeated recognition highlights the enduring importance of game theory in modern economics.

Illness and Resilience: A Broken and Rebuilt Life

When discussing John Nash, one cannot ignore his long struggle with mental illness.

Diagnosed with schizophrenia in the late 1950s, Nash endured extremely difficult periods. His condition first manifested as paranoia; he reportedly believed that men wearing red ties were part of a communist conspiracy against him.

In May 1959, he was diagnosed with paranoid schizophrenia and spent several periods in psychiatric hospitals during the 1960s. After 1970, however, he was never hospitalized again and gradually returned to an active intellectual life.

A Life Portrayed on Screen—and a Lasting Legacy

John Nash's life was told in the biography *A Beautiful Mind* by Sylvia Nasar, which won the National Book Critics Circle Award in 1998.

A film adaptation of the same name was released in 2001, starring Russell Crowe as Nash. The film went on to win the Academy Award for Best Picture in 2002.

Following Nash's death in 2015, renewed interest in his ideas has emerged. Artificial intelligence, algorithm design, and the study of complex social systems increasingly rely on the conceptual foundations of game theory.

Far from fading into the background, the field continues to evolve—and it remains to be seen what new equilibria and surprises will arise where mathematics meets psychology and intelligent machines.

John Nash did not only revolutionize mathematics. He gave us a powerful mirror for understanding why individuals, companies, and nations sometimes make collectively disastrous decisions—and how we might design systems that encourage better outcomes.

A lesson that is more relevant today than ever.

Join us for the next episode of EconoMag!

Vocabulary:

1. **Nobel Prize in Economics** – Prix Nobel d'économie
2. **John Nash** – John Nash
3. **Abel Prize** – Prix Abel
4. **Mathematics** – Mathématiques
5. **Game theory** – Théorie des jeux
6. **Nash equilibrium** – Équilibre de Nash
7. **Non-cooperative games** – Jeux non coopératifs
8. **Strategic interaction** – Interaction stratégique
9. **Decision-maker** – Décideur

10. **Prisoner's Dilemma** – Dilemme du prisonnier
11. **Socially optimal outcome** – Résultat socialement optimal
12. **Market failure** – Défaillance du marché
13. **Trade war** – Guerre commerciale
14. **Public policy** – Politique publique
15. **Diplomacy** – Diplomatie
16. **Algorithm design** – Conception d'algorithmes
17. **Digital sector** – Secteur numérique
18. **Artificial intelligence** – Intelligence artificielle
19. **Big data** – Données massives
20. **Duopoly** – Duopole
21. **Oligopoly** – Oligopole
22. **Auction mechanism** – Mécanisme d'enchères
23. **Geopolitics** – Géopolitique
24. **Nuclear deterrence** – Dissuasion nucléaire
25. **Schizophrenia** – Schizophrénie
26. **Paranoia** – Paranoïa
27. **Psychiatric hospital** – Hôpital psychiatrique
28. **Biography** – Biographie
29. **Film adaptation** – Adaptation cinématographique
30. **Collective decision** – Décision collective