**Laudation**

I first saw László Lovász in 1966. I was twelve years old, he was eighteen. This was the year when the first spacecraft made a soft landing on the Moon, sending back panoramic images of the Lunar surface and the distant Earth. In the same year, Terje Lomo discovered long-term potentiation — the strengthening of synaptic neural connections in the hippocampus — which became the foundation of our modern understanding of learning and memory. It was a great time for science!

I did not meet Lovász in person; I saw him on TV. In Hungary, we had only one TV channel, but it broadcast the finals of the national mathematics competition for high-school students, *Who is a Genius*? The entire country watched, holding its breath, as the contestants solved difficult problems with just one minute to think. Lovász, a very likable, modest and brilliant student from Budapest, was the winner.

The world of mathematics abounds with brilliant problem solvers. László Lovász is one of them. Early in his career, he solved several famous open problems, including Berge’s weak Perfect Graph Conjecture and Shannon’s Capacity problem from information theory. At the age of 25, he discovered the Lovász Local Lemma which, together with its algorithmic versions, has become a standard tool for finding a “needle in a haystack.”

However, in my opinion, the true significance of Lovász’ work lies not in settling well known open problems. He is arguably the most influential theory builder of modern discrete mathematics. His greatest strength is to envision a new field of research, unite existing mathematical ideas, and develop the area in depth. Along the way, he consistently establishes fundamental and deep theorems. Where he is unparalleled, though, is his sense of mathematical architecture. He builds vast and elegant frameworks—spacious foundation with access to mathematical resources—into which other researchers can step, explore, and create. This talent comes as an added gift to his brilliance as a problem solver.

This aspect of Lovász’s work is already demonstrated by the afterlife of Shannon’s Capacity problem. Building on his elegant solution, he introduced a new concept, the Lovász number of a graph, which is neatly sandwiched between two of the most important graph parameters: the clique number and the chromatic number. Soon thereafter, together with Grötschel and Schrijver, he proved that the Lovász number can be efficiently approximated in polynomial time using the ellipsoid method for linear programming. This result has found applications in circuit complexity, and its generalization to non-commutative graphs has become a key tool in quantum computing.

However, this is not the end of the story! Lovász’s approach inspired Goemans and Williamson to develop approximation algorithms for semi-definite programming, an advance that revolutionized convex optimization. Remarkably, the approximation ratios achieved by these algorithms are essentially optimal, up to Khot’s Unique Games conjecture.

Yet even this is not the end! The computational hardness of approximation is one of the most fundamental questions at the intersection of mathematical logic, computer science, pure and applied mathematics. The PCP (Probabilistically Checkable Proofs) theorem stands as the crown jewel of this theory. Lovász shared the 2001 Gödel Prize for its discovery.

I could tell a similarly remarkable story about the Lenstra-Lenstra-Lovász algorithm for Lattice Basis Reduction, originally developed to address problems in simultaneous Diophantine approximation. The algorithm has since found far-reaching applications in computational number theory and cryptography.

The last theory of discrete mathematics that Lovász built is the theory of graph convergence. Its roots extend to ergodic theory, analysis, statistical physics, and probability theory. We now understand how the pioneering works of Szemerédi, Furstenberg, Frieze, Kannan, Aldous, Benjamini, and Schramm laid the groundwork for this new field. It was Lovász who unified these early insights into a coherent and elegant theory —and who authored its definitive monograph.

Through the development of dense graph limit theory, in collaboration with many outstanding coauthors, Lovász showed that a wide range of combinatorial problems can be approached effectively within an analytic framework. Today, this theory stands as a mature and powerful branch of mathematics, with deep applications in extremal graph theory, property testing, probability theory, and statistical physics.

It is perhaps a coincidence that this year the title of the Academy’s annual meeting is “Building Bridges.” The conferences celebrating Lovász’s 60th and 70th birthdays bore exactly the same title. The choice was very fitting: Lovász has built massive bridges — not only between mathematics, computer science, and other disciplines, but also across distant realms within mathematics itself. These bridges will endure for a very long time — just like Budapest’s 175-year-old Chain Bridge!

According to its official description, *“The Erasmus Medal is awarded to honor the very best in European scholarship and personal academic achievement over a sustained period.”* It would be difficult to find anyone who embodies this ideal more fully.

János Pach