

Grigori Perelman's Beautiful Mind

By JASCHA HOFFMAN

In 1904 the French mathematician Henri Poincaré made a conjecture about three-dimensional space that may help to explain the shape of the universe. Although it was crucial to the growth of the field of topology, Poincaré's conjecture resisted proof for a century. When a Boston philanthropist announced a million-dollar prize for its solution in 2000 it was unclear whether he would ever have to pay.

Then, in 2002, a Russian mathematician named Grigori Perelman posted a terse paper to an online archive. In the course of tackling a broader problem, Perelman seemed to have miraculously swept away the remaining obstacles to proving the Poincaré conjecture. Soon the mathematical rumor mill was buzzing. The proof seemed genuine, but word was that Perelman had no plans to publish it.

This was only the beginning of the weirdness. After a brief trip to the United States with his mother in tow, Perelman retreated to St. Petersburg and ceased communication with all but a few colleagues vetting his work. He declined the Fields Medal, a gesture equivalent to snubbing the Nobel committee. He then resigned from the Steklov Institute in 2005 with a letter that read, "I have been disappointed in mathematics and I want to try something else."

Why did Perelman turn his back on the world? This question haunts Masha Gessen's *Perfect Rigor*, a dogged portrait of an elusive man. Gessen, a Russian-born journalist who has written books on the post-Soviet intelligentsia and on the pitfalls of genetic testing, is no stranger to the burdens of uncommon knowledge. Without a shred of help from Perelman himself, she charts the mathematician's rise from quiet super-student to prickly genius, suggesting that the very perfectionism that fueled his work may have been the cause of his alienation.

Born to a mother whose own math career was foiled by discrimination, the young Perelman excelled at the distinctly Russian sport of competitive mathematics in the 1970s. Gessen gives ample background on his coaches and classmates, who describe him mostly as "a sort of math angel" who never made mistakes. Stuck with a tricky problem, the young Perelman would bounce a Ping-Pong ball against his desk, vigorously rub his thigh and hum or moan until he had the answer.

By the time Perelman got to university, his fingernails were so long they had begun to curl. He wanted little more than to continue his work undisturbed—and protected by a Who's Who of Russian mathematicians, he seems to have gotten his wish. After emerging from graduate school as the Soviet Union crumbled, Perelman taught briefly in the United States in the early 1990s (where he wore the same brown corduroy jacket day after day and survived on a diet of black bread and fermented milk). But soon he returned to St. Petersburg and the seclusion of his mother's apartment. It was there that he would spend most of a decade working on the Poincaré conjecture.

Perhaps because of his silence, Perelman has become a kind of mathematical Rorschach test. Some of his peers see him as a righteous nonconformist, others as a cranky purist. Drawing on interviews with colleagues scattered from France to Israel, Gessen proposes that Perelman's disillusionment was a product of the same "rigid, demanding and hypercritical" habits of mind that made him a genius. With an armchair diagnosis of Asperger's syndrome, she suggests that he was unable, and not simply unwilling, to play by anyone's rules but his own.

Given the lack of firsthand evidence about Perelman's motives, one could have hoped for a clearer sense of the work he pursued with such devotion. Gessen, herself a "math junkie" in school, confines the math to a single difficult chapter. (Readers who want more should consult Donal O'Shea's lucid book, *The Poincaré Conjecture*.) But she does provide a thorough account of the circumstances that led to Perelman's rise in the "vicious, backstabbing little world" of Soviet mathematics and a brilliant reconstruction of the twisted logic that might have led to his mysterious exit. In so doing she has written something rare: an accessible book about an unreachable man.

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