

Gian-Carlo Rota

Italian-born American mathematician **Gian-Carlo Rota** (April 27, 1932 – April 18, 1999) is credited with transforming his specialty, combinatorics, from an under explored field to one of the most important in mathematics today. Rota described combinatorics as “putting different colored marbles in different colored boxes, seeing how many ways you can divide them.” His father was a civil engineer and architect who specialized in anti-earthquake structures. Near the end of the World War II, the elder Rota, a prominent anti-fascist, and his family were forced to leave their home at Vigevano to escape Mussolini’s death squads. They crossed into Switzerland from northern Italy and eventually made it to Ecuador. Young Rota arrived in the U.S. in 1950 and earned a B.A. summa cum laude from Princeton University three years later. His Master’s Degree in mathematics was awarded in 1954 and there followed a Ph.D., in 1956, from Yale University for a thesis, *Extension Theory of Differential Operators*, supervised by Jacob T. Schwarz.



Rota did postdoctoral research at the Courant Institute at New York University. In 1957, he was appointed a Benjamin Peirce Instructor at Harvard, a post he held until 1959 when he joined the faculty of the Massachusetts Institute of Technology, where he remained for the rest of his career. Rota found his mathematical specialty, combinatorics, while researching ergodic theory for two 1959-1960 papers. His first major work in the area was *On the Foundations of Combinatorial Theory* (1964), the first of ten papers with this main title to be published over some twenty years. Each of the subsequent nine papers had subtitles and co-authors. MIT professor and former Rota student, Richard Stanley, said: “Gian-Carlo Rota almost single-handedly lifted the subject of combinatorics from a barely respectable obscurity to one of the most active areas of mathematics today.”

Rota founded three journals: *Journal of Combinatorial Theory* (1966), *Advances in Mathematics* (1967), and *Advances in Applied Mathematics* (1979). He was the founding editor of several book series, including *Mathematicians of Our Time*; *Contemporary Mathematicians*, and *Encyclopedia of Mathematics*. He was co-author of a book of essays on mathematics, science and philosophy called *Discrete Thoughts* (1986), followed by *Indiscrete Thoughts* (1997). At the time of his death of heart failure at age 66, he was preparing a third book to be called *Forbidden Thoughts*. In a review of *Indiscrete Thoughts*,

Philip J. Davis, professor emeritus of applied mathematics at Brown University, wrote:

“For a long time, I have thought that if I were asked to elect a “Mr. Mathematics USA” ... I would vote for Rota. His knowledge of mathematics, its application, its history is profound and extensive. His acquaintances in the world mathematical establishment are vast. His interests go far beyond proving theorems or creating new structures. His opinions are sharp and often surprising. His prose is scintillating and often brutal.”

At MIT Rota was revered as a great teacher, who “always seemed to have so much fun teaching”. He claimed that there were four requirements for a good lecture. They may seem obvious, but not everyone who lectures honors them. They are:

1. Every lecture should make only one point.
2. Never run overtime
3. Relate to your audience.
4. Give them something to take home.

David Sharp wrote of Rota: “Gian-Carlo could have been the inspiration for the expression, ‘a thousand points of light’, all by himself.” Herbert S. Wilf remembered Rota by listing some descriptive adjectives: “Gian-Carlo was *generous* in his praise of his students, and of others, and was *generous* with his help.... Gian-Carlo Rota was *elegant* in his thought, in his speech, his dress, and in his general demeanor.... Gianco was an important – a very *influential* mathematician. ... the overall tone of the remarks [at the memorial service for Rota at MIT] was best described by the adjective ... ‘*beloved*’.

Rota enjoyed creating lists of tens, giving “Ten rules for the survival of a mathematics department”:

1. Never wash your dirty linen in public.
2. Never go above the head of your department.
3. Never compare fields.
4. Remember that the grocery bill is a piece of mathematics, too.
5. Do not look down on good teachers.
6. Write expository papers.
7. Do not show your questioners to the door.
8. View the mathematical community as a united front.
9. Attack flakiness.

10. Learn when to withdraw.

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1. You can and will work at a desk for seven hours straight, routinely
2. You learn what you don't know you are learning.
3. By and large, "knowing how" matters more than "knowing what."
4. In science and engineering, you can fool very little of the time.
5. You don't have to be a genius to do creative work.
6. You must measure up to a very high level of performance.
7. The world and your career are unpredictable, so you are better off learning subjects of permanent value.
8. You are never going to catch up, and neither is anyone else.
9. The future belongs to the computer-literate-squared.
10. Mathematics is still the queen of the sciences.

Rota was fluent in English, Italian, Spanish and French and could read German and Latin. He married Teresa Rondón in 1956, and they divorced in 1980. He died of heart failure in his sleep in his home at the age of 66. His death was discovered when he failed to arrive in Philadelphia to give a lecture series at Temple University. His ashes were buried in the town of his birth in Italy.

Quotation of the Day: "The earliest glimmers of mathematical understanding in civilized man were combinatorial. The most backward civilization, whenever it let fantasy roam as far as the world of numbers and geometric figures, would promptly come up with binomial coefficients, magic squares, or some rudimentary classification of solid polyhedra." –

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