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Gian-Carlo Rota: In Memoriam

Reprinted from the June 1999 issue of SIAM News.

Gian-Carlo Rota, a professor of applied mathematics and philosophy at the Massachusetts Institute of Technology, died of heart failure, apparently in his sleep, around April 18, 1999.

Rota was born in Vigevano, Italy, on April 27, 1932. Forced to flee Mussolini's death squads, his family left Italy in 1945, after which they lived for a time in Ecuador. His sister, Ester Rota Gasperoni, recounted the family's escape from Italy in two books, *Orage sur le Lac* and *L'arbre des Capulies*. Rota came to the United States in 1950; he received a BA from Princeton University and, in 1956, a PhD from Yale University under Jacob T. Schwartz.

He held postdoctoral positions at the Courant Institute and Harvard University before arriving at MIT in 1959. Except for a short hiatus at Rockefeller University (1965-67), he remained at MIT until his death, much to the good fortune of countless MIT undergraduates, graduate students, visitors, and faculty who were able to share his enthusiasm and joy for mathematics, philosophy, and life in general.

This brief chronicle of events, of course, in no way conveys what the man was really like. Being associated with Gianco meant far more than mathematical discussions and lectures. He became an important part of the personal lives of his friends and colleagues. He took a genuine interest in the well-being of all his associates and made many selfless sacrifices of time, money and intellectual effort on their behalf. It almost goes without saying that this altruism, together with his beautifully prepared and delivered lectures, made him one of the most popular and respected teachers at MIT.

Rota had far-ranging mathematical interests, but his first love (developed after he had received his doctorate in functional analysis) was combinatorics. He intuitively realized that combinatorics, which in the early 1960's was not considered a "serious" subject and was regarded with disdain by most leading mathematicians, had tremendous potential to develop into

a mature and important area which would enrich many other seemingly unrelated parts of mathematics. Intuitive understanding of this type was characteristic of Rota's work—he was always looking for the "big picture" and trying to understand the true essence of any subject in which he was interested.

A seminal development for the future of combinatorics was the Foundations, a series of papers inaugurated by Rota with his now famous "On the Foundations of Combinatorial Theory I. Theory of Möbius Functions" (*Z. Wahrscheinlichkeitstheorie* 2 (1964) 340-368). This paper immediately captured the imagination of many young mathematicians (including myself) and planted the seeds for many subsequent developments within combinatorics, such as the theory of topological combinatorics and the tremendous expansion of matroid theory. Rota followed up the "Foundations I" paper with over 80 further papers in combinatorics (to say nothing of papers, essays, and reviews in many other areas of mathematics and in philosophy) that established him as the founding father and leading guru of the new subject of algebraic combinatorics.

An important watershed in the development of combinatorics was the NSF Advanced Science Seminar in Combinatorial Theory at Bowdoin College during the summer of 1971. Gian-Carlo presided over this meeting as a godfather of the "new combinatorics." He was involved in all aspects of the eight-week meeting, from the mathematical content to social activities. I recall one pedagogical innovation of his—the tandem lecture. He would choose about six people from the audience who had to leave the room and not talk to each other. He would then call them into the lecture hall one at a time to deliver a five-minute lecture. Each lecture had to be a continuation of the previous lecture, based on what the previous speaker had left on the blackboard.

There were many other facets of Rota's complex personality that I can only hint at here. He was deeply interested in phenomenology and wrote many papers and essays in this area. Although English was not his native language, he achieved a mastery of it that far surpassed the best efforts of most native speakers. He

wrote innumerable completely honest and lucid essays on mathematicians and the practice of mathematics, many of them collected into the books *Discrete Thoughts* and *Indiscrete Thoughts*. He was working on a book of provocative quotations entitled *Forbidden Thoughts* at the time of his death.

Rota developed *Advances in Mathematics* virtually single-handedly into one of the leading journals of research mathematics, and he was the editor-in-chief of the *Encyclopedia of Mathematics*, a book series that contains definitive expositions of a wide range of mathematical topics. In the course of his career, he held visiting positions at ten universities throughout the world, and, beginning in 1966, he was a consultant at Los Alamos National Laboratory. He received four honorary degrees (and was just about to receive an-

other, from Nankai University); also among his honors are the Steele Prize of the American Mathematical Society (1988) and the Killian Faculty Achievement Award at MIT (1996). He was appointed the Norbert Wiener Professor of Mathematics at MIT for a five-year period beginning in 1998, and he was the Colloquium Lecturer of the American Mathematical Society in 1998.

Gianco had the extraordinary ability to touch deeply the lives of all with whom he associated, whatever their background and experience. Rarely, if ever, has the passing of a professional mathematician left such a large void.

Richard Stanley
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Math applies to everyday life
Whether you are measuring sugar or dealing with
 strife.

Counting calories in a diet
Saving for a car, and it is time to buy it.
Planning ahead for your college years,
Calculating your interest in the bank with tears.
Taking a vacation in a car,
Planning for motels and the distance thus far.
Building a house and measuring the walls,
Driving the distance to the nearest malls.
Filling your car with a tank of gas,
Using a movie coupon as a pass.
Add, subtract, multiply or divide,
The choices are many, and you must decide.
Baking a pie at the right degree,
Means a lot to you and your family.
Geometry helps in the game of pool,
You need to know angles if you want to rule.
Music requires counting the beat,
Rhythm and rhyme and good timing meet.
Understanding math is important, you see,
It is passed through the years throughout history.
Math applies without a doubt to all that you do.
Understanding math can carry you through.

Geoffrey Smith

Algebra algebra,. You were so tough!
Of X's and Y's I'd had quite enough!
Expressions, equations, inequalities too,
As to finding solutions, I hadn't a clue!
Multiplication, addition, division, subtraction,
All your hard work drove me to distraction!
Your secretive variable was always unknown,
Unless you got lucky and found it alone!
But then came a lesson I learned from a friend,
And now I'm no longer at my wit's end.
When faced with a value that seems undefined,
The trick is to relax and open your mind,
So the knowledge that's in there can flow unarrested,
And answers can come easily in class when I'm tested.

Ryan Best

Math is a subject that is the best,
I like it better than all the rest.
It is so complex and so interesting,
I never know how much work it could be.
First with addition, then subtraction,
Then moving on to things like fractions.
Multiplication, division, and more,
Then on to geometry with shapes galore.
As I grew older with more math ahead,
It was so fun, some think I never could dread.
Then on to algebra and the metric system,
Having good attendance, I didn't want to miss 'em.

Alexandra Holliday