The 2009 Abel Prize Ceremony

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On 19 May this year the 2009 Abel Prize was presented to Mikhail Gromov by King Harald of Norway at a ceremony in Oslo. Gromov is a Permanent Professor at Institut des Hautes Etudes Scientifiques in France and Jay Gould Professor at the Courant Institute of Mathematical Sciences in New York. The prize was awarded for 'his revolutionary contributions to geometry'. I was there because of my membership of the Abel Prize Committee which is responsible for making the recommendation to The Norwegian Academy of Science and Letters. The Abel Prize has only existed since 2002, the two-hundredth anniversary of the birth of Niels Hendrik Abel, but already it is regarded as the premier international career prize in the mathematical sciences and generally referred to in the media as the Nobel Prize of mathematics. Further information about the history of the prize can be found on the official website, http://www.abelprisen.no/en/.

Mikhail Gromov. Image ©Oberwolfach Photo Collection.

The Abel Prize Committee consists of a Norwegian chair plus four international mathematical scientists each of whom serve two-year terms, that is for two prizes. In a speech at a dinner the preceding evening one of my fellow committee members quipped that the hardest task of the committee is the writing of the citation, which I append below.

At the Abel Lectures, held on 20 May, after a fascinating lecture by Gromov himself on modeling bulk, Jeff Cheeger of the Courant Institute presented an account of Gromov's contributions to Riemannian Geometry while Martin Bridson of Oxford University discussed his work in geometric group theory. Both were brilliant presentations. The program concluded with a superb applied presentation by Guillaume Sapiro of the University of Minnesota on the application of Gromov–Hausdorff distance to image processing.

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Gromov Citation

Geometry is one of the oldest fields of mathematics; it has engaged the attention of great mathematicians through the centuries, but underwent revolutionary change during the last 50 years. Mikhail Gromov has led some of the most important developments, producing profoundly original general ideas which have resulted in new perspectives on geometry and other areas of mathematics.

Riemannian geometry developed from the study of curved surfaces and their higher dimensional analogues, and has found applications for instance to the theory of general relativity. Gromov played a decisive role in the creation of modern global Riemannian geometry. His solutions of important problems in global geometry relied on new general concepts, such as convergence of Riemannian manifolds and a compactness principle, which now bear his name.

Gromov is one of the founders of the field of global symplectic geometry. Holomorphic curves were known to be an important tool in the geometry of complex manifolds. However, the environment of integrable complex structures was too rigid. In a famous paper in 1985, he extended the concept of holomorphic curves to J-holomorphic curves on symplectic manifolds. This led to the theory of Gromov–Witten invariants, which is now an extremely active subject linked to modern quantum field theory. It also led to the creation of symplectic topology and gradually penetrated and transformed many other areas of mathematics.

Gromov's work on groups of polynomial growth introduced ideas that forever changed the way in which a discrete infinite group is viewed. He discovered the geometry of discrete groups and solved several outstanding problems. His geometrical approach rendered complicated combinatorial arguments much more natural and powerful.

Mikhail Gromov is always in pursuit of new questions and is constantly thinking of new ideas for solutions of long-standing problems. He has produced deep and original work throughout his career and remains remarkably creative. The work of Gromov will continue to be a source of inspiration for many future mathematical discoveries.

Neil Trudinger has been a professor of mathematics at The Australian National University since 1973 and was President of the Australian Mathematical Society from 1986 to 1988.