Public Image of Mathematics

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A round table discussion:
(Roland Bulirsch, Madame Mireille Chaleyat-Maurel, Gyula Bencze)
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Introductory remarks by R. Bulirsch

The public image of mathematics is not of the best. The work of mathematicians
and to a certain extent the work of computer scientists is not considered as an
important contribution to our civilisation. Even in countries like France where
mathematics enjoyed a higher reputation than elsewhere, things have changed.
Mathematicians are dismayed to find “public” doors closed and there are increasing
problems in obtaining financial supports for their research projects.

Part of the difficulty is with mathematics itself: to present rather abstract
things to a public inundated by a deluge of pictures makes it a tough job to
put mathematics in the right sight. But part of the difficulty is also with the
mathematicians themselves: very many of them are unwilling to demonstrate the
importance of their work fearing that popularization of mathematics could do
damage to the, as they say, flawless image of mathematics, the “purest of the pure
sciences”.

At the Munich University of Technology some films have been produced
to show the non-mathematical public, the educated layman, what kind of use­
ful things mathematics can do in our life.

− Flow and currents in tiny transistors, the coloured images show the solution
  of a complicated system of nonlinear partial differential equations of elliptic
type.

− The optimal design of a spacecraft and its optimal flight trajectory to a
  planet like Venus. A visualisation of a highly complicated nonlinear multi­
  point boundary value problem arising from optimal control theory.

− Evolution of the Sun in its 12 billion years life-cycle. Another visualization of
  the solutions of a highly complicated system of partial differential equation
  of parabolic type.

After the presentation comments were made by panelists and the audience:

Mr. Gyula Bencze

It is generally believed by the public that mathematics as a science is extremely
uninteresting, “dry” (meaning difficult to digest), and devoid of exciting new de­
velopments. It is also held that those – especially young students – interested in
various mathematical problems are in some sense “strange” and differ from people with “normal” interests. While this is more or less an accurate description of the situation in Hungary, my personal experience in several European countries as well as in the US led me to assume that it is a problem shared by almost every country.

In addition the general public has in fact very little idea of what mathematicians are actually doing and how important mathematics is in forming our way of thinking. This is reflected by the curious phenomenon that in Hungary – as a rule – the most popular TV personalities boast about their bad marks in high school math. Had they known that the inability to learn basic mathematics is strongly correlated with stupidity and low IQ they most certainly wouldn’t be so proud of their “achievement”. In Hungary, according to the Central European tradition of “classical” education, one can be an “intellectual” without a morsel of knowledge in both mathematics and (natural) sciences. In fact recently in a national TV broadcast our country’s “intellectual elite” was mentioned to consist of some politicians(!), journalists, writers as well as economists. Not a single scientist was even considered as a candidate for inclusion in this prestigious ensemble!

While most scientists – including myself as a theoretical physicist – are either practitioners of mathematical methods or at least are fully aware of the importance of mathematics as a tool for both theory and practical applications, the society’s decision makers as well as the general public are almost totally ignorant of the relevant facts.

In a democratic society the funding of scientific research is supported indirectly by taxpayers’ money on the decision of politicians. It is imperative that both politicians and the public should be fully informed about the importance of mathematics and science in general. This most important task is best done by the scientists themselves. However, it is not very easy to formulate in simple terms the basic goals of mathematics research. In any case, it is the scientists’ responsibility that, instead of the sensationalism of the mass media, accurate and easily understandable information is provided on the most important results of mathematics with due emphasis on their practical application. This is the only way that an increased support for basic research can be secured.

In order to emphasise that the education of not only the public but the politicians is equally important, let me just mention that Hungary’s minister of defense, according to his own admission, is a firm believer in UFOs! Other high level politicians are also avid fans of the worst kind of pseudoscience while the grave financial problems of “official science” obtain no such (moral) support.

Mathematicians sometimes argue that physics and other branches of natural science can more easily get funds for research due to the more attractively worded research proposals, e. g. “quark-gluon plasma phase transition” or “search for traces of life on other planets”. I can assure you that in Hungary mathematics is not a subject of negative discrimination; in fact all branches of (natural) science have the same (insufficient) level of funding.

There is, however, a single advantage that mathematics has over all branches of science: the almost complete absence of pseudoscience and charlatanism flooding almost all the new democracies! The explanation seems to be simple; even the solution of the simplest mathematical problems requires some mental effort,
moreover it is easy to distinguish between good mathematics and quackery. On the other hand, as an example of the other extreme, wherever you look, you find people who want to extract the infinite energy of the physical vacuum, or the army of “alternative healers” who claim to be able to treat all the incurable diseases including AIDS!

To conclude this short comment, I agree with the opinion expressed by a number of people here that the public image of mathematics can be changed to its advantage only through concentrated effort of the scientists themselves with the help of properly educated – and sympathetic – representatives of the mass media.

Mr. Carlo Sempi
I wish to argue that part of the responsibility for the poor image of mathematics lies with us. Other scientists, notably physicists and biologists, are willing to present their researches in a form accessible to the general public. Some of the results presented by the physicists are no less abstract than what mathematicians do. The cultivated layman is aware of some of the problems of modern physics – the search for fundamental particles or the exploration of the universe – or of biology, for example the study of genes and of viruses. The general view of mathematics seems to be that of a perfect building, which has always been in the present shape; some parts of the building are still covered and, from time to time, a veil is dropped to reveal a tiny piece. Mathematics appears to be without both life and history. As a consequence, nobody, even among the cultivated public, knows what the problems of modern mathematics are. We are also hindered by our belief in rigour; this makes everything we write or say for the non-specialist liable to be attacked by colleagues ready to point out the lack of precision or of complete assumptions.

Mr. Kuku Aderemi
It cannot be over-emphasised that there is a crying need to repair the dented image of mathematics all over the world through intensive popularisation efforts at national, subregional, regional and global levels. For one thing, the number of young people choosing careers in mathematics is dwindling in quality and quantity because of the generally unfavourable image of the subject resulting in a generally un-complementary attitude, bordering on hostility from government functionaries, funding agencies, parents and the general public.

One major reason for this hostility has to do with the historical development of the subject that makes people rather ignorant of what mathematicians do. Indeed, those who study mathematics up to high school know little more than the mathematics discovered in the 17th century. Moreover, most of the basic and applicable mathematics discovered in the last two hundred years are yet to find their places in the mathematics education curricula at the appropriate levels and/or published for the information of the general public.

It is well known that most research mathematicians, who are best equipped to propagate mathematics through simplification of the ideas, are not interested in doing so. So, it is essential to re-orientate the training of mathematics educators – those working for masters/Ph.D. degrees in mathematics education – to include
the ability to simplify contemporary mathematical ideas. This involves exposing them to a lot more mathematics at graduate level.

To popularise mathematics, all modes and media should be exploited: electronic communication, including e-mail, satellite communication, print and electronic media, e.g., newspapers, popular magazines, radio, TV, Videos, Audio Visuals. Mathematical organisations at national and regional levels should flood the whole world with popular writings on what mathematics is good for, etc, etc.

Mr. Jean-Pierre Bourguignon

Two points seem to be worth mentioning:

1. **Opposing fundamental mathematics to applications of mathematics when speaking of mathematics to the public seems inappropriate** to me since the very nature of mathematics is the mixing of the two. Throughout history, mathematicians have been solving problems raised by concrete situations, and many times the solution involved objects that had been introduced earlier (sometimes by other mathematicians) for completely different purposes (think of the ellipse as a geometric object studied as such that later turns out to be fundamental as a dynamical object in the solution of the two-body problem in Celestial Mechanics). This is the real power of abstraction. In this connection it may be worth recalling a definition of mathematics proposed by Henri Poincaré: “to do mathematics is to give the same name to two different objects”.

2. One should **not overlook the possibility of creating public events centered around mathematics.** Quite often professional people from the media consider this very risky. My experience based on a number of different situations in France is that any time such an event is created, some official organizers are reluctant, but more people turn up than expected, sometimes even in record breaking numbers: this happened for the day devoted to young people at the Ministry of Research on the occasion of the awarding of the 1994 Fields medals; this happened again for the whole week of mathematical events that were organized in Bures-sur-Yvette “Les Mathématiques dans la Ville”, and gathered more people (a great majority of them non-scientists) than any other cultural week in this small town. I also experienced the same thing in smaller towns in France, such as Biarritz or Pau, where local groups put together a series of conferences on mathematics for a couple of weeks with impressive audiences.