Laudatio bij de verlening van het eredoctoraat aan dr. H.O. Pollak

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door prof.dr. N.G. de Bruijn

Henri Otto Pollak,

The reasons for the present event should be seen in the light of the spirit that has lived in our mathematics department since its start, 25 years ago. Your work and your personality stand for the values we have cherished.

In preparation for this occasion I asked a colleague for some of your papers. Because of alphabetic filing, your work stood between Balthasar van der Pol and George Pólya, and this was a very significant position indeed. On one side Pólya. His work in concrete analysis, in probability theory and in combinatorics is so well known in our department, and his ideas on the teaching of mathematics are so much in tune with yours and ours. On the other side Van der Pol.

In the year 2000, people might ask what was the most important 20th century mathematical event in Eindhoven. It might very well be that the answer is not something that happened in our mathematics department, but a thing that took place in the twenties, long before our department started, in an industrial laboratory in this city: Van der Pol's discovery of a mathematical model, in the form of a non-linear differential equation, for vibrational phenomena. It opened a vast area of research that no doubt will be fully alive in the year 2000.
Your name fits well between these two great people: your place in the mathematical world is somewhere between Van der Pol and Pólya.

You are a powerful mathematician indeed, but that is not the main reason for awarding a honorary doctorate. The main reason is that you are a mathematician of the type industry needs. You are obviously not doing mathematics for your own glory. Most of what you do is in collaboration with others, and much of your work is in other people's papers, attributed to you in footnotes. Since you know so many fields and you think so fast, you are always able to listen to people and help with a significant remark. For that reason you are an ideal person as leader of the mathematics and statistics group of the famous Bell Telephone Laboratories in Murray Hill, NJ.

There are more reasons for your success as a leader. You have a good nose for what is important in mathematics and what is just highbrow and sterile. This brings us to the reason why we appreciate your extensive activity in the field of mathematics teaching. So much in the teaching world is in the hands of people who never looked over the fence into the real world. In particular, in the developing countries the first attempts are usually towards impressive mathematics, not towards applicable mathematics. A reason may be that abstract mathematics is so easy to teach.

By the way, it is not only in developing countries that this attitude can be found. It can also be seen in your country and ours. Usually people who do the real work do not have the time to counteract this tendency. We are very glad that you have been making the time for it.
The educational world generally appreciates what you are doing, and that is why they asked you to organize the large ICME congress (International Congress on Mathematical Education) on mathematical education last year in Berkeley. Its great success was due to you in the first place.

The fact that your values are so close to ours is not purely accidental. This university had hardly started when two of our mathematics professors, Seidel and Veltkamp, travelled through the US in order to learn more about the role of mathematics in industry and of course paid a visit to the laboratories at Murray Hill. A few years later we asked your advice for the organization of our 'mathematical engineering' curriculum. Also it was you who advised us to get involved in discrete mathematics as a booming area in industry, and much of our activity in this field is related to Van Lint's many visits to Murray Hill.

What we always learned from you is something that belongs to the philosophy of your laboratory. It was already expressed by your predecessor Thornton Fry. It is that we should not train industrial mathematicians as just problem solvers who solve the harder problems with their bag of tricks. The mathematician's role should be to help formulate the problems and to invent the mathematical models.

Today we have to train mathematicians for tomorrow's industry. We cannot look very far into the future but one does not have to be very good at crystal gazing in order to see the ever growing importance of mathematics in a world of highly organized complexity. The training of young people for this future has to be carried out under the grim boundary conditions of modern bureaucracy.
Therefore, we will surely need your advice again and again. I am sure you will be helpful, just because you are a wise and helpful man. It gives me great satisfaction to confer this honorary doctorate to you.

'By virtue of the authority vested in it by law, and on behalf of the Committee of Deans, I hereby award to you,

Henry Otto Pollak

the degree of doctor honoris causa in technical sciences

on account of
- your contribution to the teaching of applied mathe-

matics, in particular, to the needs of non-mathematicians;
- your efforts for promoting the use of mathematics in industry and your contribution to establishing the identity of industrial mathematics;
- your efforts for establishing the teaching of mathematics in developing countries; and
- your pioneering dedication to mathematical science, particulary, in the fields of analysis and discrete mathematics.

In token hereof, I grant you the prerogatives attached to this degree and present you with the diploma which is signed by the rector magnificus and by the promotor, and provided with the University Seal. At the same time, you will be invested with the insignia of your doctorate.'

Antwoord van dr. Pollak bij het aanvaarden van het eredoctoraat

You have been so kind as to honor me for a variety of things - for efforts in connection with the teaching of mathematics, for promoting the use of mathematics in industry, for contributions to mathematical research in analysis and discrete mathematics.
What you have really described is a man who does not know what he is: a politician with no well-defined constituency, a ship with no home port, an enthusiast with no single-minded commitment and no simple standard which would make it so easy to judge every issue as it comes along. A man who wears many hats has a lot of trouble wearing them on the same head.

Many of my predecessors and colleagues in mathematics in Bell Laboratories - Hendrik Bode, Sid Darlington, Claude Shannon and Dave Slepian for example - found their instinctive home among the electrical engineers. I am also called an engineer - but only by some of my mathematical 'friends' in the university. To the engineers at Bell Laboratories, I am a mathematician, but one of a strange breed we nurture at Bell Laboratories that you can talk to in your own language and that, as you pointed out, insists on helping to find the problem as well as to solve it.

I have always found real satisfaction in this diversity of activities, - having a foot in many camps. So many of the exciting frontiers, in both research and in industry and in education, are multi-disciplinary. When students ask my advice on what to major in, I always urge them to be strong in two fields, say in mathematics and biology, or mathematics and economics, or mathematics and computer science. I consider this to be recession-proof education; in the most difficult times the person with strength in two fields and the ability to relate them and to use one in the other, will always have a job. This dual strength is also extremely satisfying. Your mathematical engineering program is a fine example of this spirit. Finally after many years it is now beginning to find its imitators in the United States. The multidisciplinary mathematical sciences major at Stanford, I am told, has more students, and more students going to graduate school, than straight mathematics!
IOWO (Instituut Ontwikkeling Wiskunde-Onderwijs) was, in my opinion, a great example of mixing the real world, and science, and the best results of educational research, and mathematics into a first-rate collection of curricula. I enjoyed it and was sorry to see it end. It was, I am afraid, an example of a multidimensional vision being lost to the simplistic one-dimensional standard I mentioned earlier. In the last few years, I have tried in vain in the United States to get a project started to rethink the curriculum throughout the elementary and secondary schools now that the hand held calculator and the microprocessor are here, and have changed our assumptions, our requirements, and our opportunities in education. We can now get our data from the real world without making the lesson impossibly difficult. We can tie together mathematics and science and social science in an incredibly effective way, we can make educational real to the youngsters - and I cannot get anyone to support this. England is the only country where this new opportunity for synthesis of educational experience is being considered seriously.

You have all participated in the arguments of our time on the purpose of education. We debate immediate usefulness, in preparing for a career, versus a broad cultural background, training versus education, earning a living versus quality of life. Mathematics is more in the thick of this than any other field and the decision is as difficult as it is anywhere. Mathematics is both useful and beautiful.
Calculus is one of the greatest inventions of the human mind - a really good idea - and it is unbelievably useful. I had the pleasure of participating 5 years ago this month in a tour of mathematics research in the People's Republic of China. Characteristically, I also insisted on seeing applications of mathematics in industry and mathematics education in the schools and colleges. At Futan University in Shanghai there was a brief lightning flash of interchange on these 2 views of mathematics. Let me read it to you.

'Kohn : Should you not present beauty of mathematics? Could not it inspire students? Is there room for the beauty of science?

Answer : The first demand is production.

Kohn : That is no answer.

Answer : Geometry was developed for practice. The evolution of geometry could not satisfy science and technology; for this reason in the 17th century Descartes discovered analytical geometry. He analyzed pistons and lathes and also the principles of analytical geometry. Newton's work came out of the development of industry. Newton said 'The basis of any theory is social practice'. There is no theory of beauty that people agree upon. Some people think one thing is beautiful, some another. Socialist construction is a beautiful thing and stimulates people here. Before the Cultural Revolution some of us believed in the beauty of mathematics but failed to solve practical problems; now we deal with water and gas pipes, cables, rolling mills. We do it for the country, the workers appreciate it, it is a beautiful feeling'.

It was an impressive, impromptu performance, but they have changed their story quite a bit in the 5 years since then.

I have enjoyed my diversity, even at the price of my homelessness. You, who have pioneered the usefulness of mathematics together with its beauty, and who as a famous university, share the fame of Eindhoven with one of the greatest industries of Europe, have been kind enough to honor me, not in spite of my refusal to play the game according to the rules, but because of it. I appreciate this more than I can say. Thank you.