

THE ESSENCE OF MATHEMATICAL LOGIC*†

Sacks : Mathematical logic started originally as an attempt to understand the foundations of mathematics and more recently it has to do with the limitations of mathematical reasoning or formal reasoning. In recent years the main application has been to computer technology.

Question : How would you account for the expansion or the increased interest shown in mathematical logic over the past few decades?

Sacks : One of the reasons for the increased interest in mathematical logic is the realization, starting twenty or twenty-five years ago, that it would have something to do with computers, that one could use the insights of mathematical logic to develop new computing machines. A more technical reason for the expansion of mathematical logic was the belief that by uncovering some of the hidden structure of mathematics it might be used to solve old and difficult mathematical problems.

Question : But what visible correlation is there between mathematical logic and, say, computer science?

Sacks : One of the early successes of mathematical logic was to develop a language for mathematics called symbolic logic. This is a very, very simplified language: I say 'simplified' compared to English or Chinese. In other words it's a language with a very small number of symbols, a very simple kind of grammar and yet it suffices to express all of mathematics. This early logical language which I have just called 'symbolic logic' was adapted in order to create languages for computers. But computers, of course, are very simple-minded, and have to operate with very simple languages, and these languages, as far as I know, were all devised by people who had earlier been exposed to symbolic logic.

Question : Between research and mathematical teaching which, would you think, a developing country like us should pursue?

Sacks : Well I think you should pursue both of course: there's a very strong connection between the ability to teach mathematics — at least at university level — and the ability to do mathematical research. People who are successful with research have a certain insight into mathematics which serves them very well when they try to communicate mathematical knowledge to others. So, obviously you should have a large

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mathematics department with enough talent to teach all the mathematics that is needed by all your emerging physical scientists, engineers, and computer people, and the like, but I think the people teaching mathematics also have to be qualified researchers.

There is another angle to the matter. I think it is important for a developing country to have people who are capable of producing new mathematical ideas. This is because over a long period of time I think new mathematical ideas are the source of all new ideas in all of science and technology.