Theory and Applications of Categories, Vol. 6.

AN APPRECIATION OF JIM LAMBEK AT MCGILL A TALK GIVEN ON THE OCCASION OF JIM LAMBEK'S 75TH BIRTHDAY

I would like to welcome all of you here, who with one exception, are here today to honour Jim Lambek.

Jim was born 75 years ago today in Leipzig, Germany. In the late 30s, he "moved" to England, where worked on a farm. When Churchill took over, in order to demonstrate his toughness, he had all German aliens examined by local magistrates and branded as harmless, as spies or as something in the middle. Jim, as an able-bodied male, I suppose, was put in the middle category (while his mother and sister were harmless). The people in the middle category were transported to the colonies, either Canada or Australia. Jim, of course, suffered the former fate. After he had spent about two years in a camp, mainly in New Brunswick (but including a week on Île Ste. Hélène, which would become the site of Expo 67), the authorities decided that people like Jim should not have been imprisoned and he was released. Those who found Canadian sponsors were allowed to stay in Canada. Fortunately, a Montreal businessman agreed to sponsor him. So he settled in Montreal and entered McGill, earning an honours degree in mathematics in 1945 and an M.Sc. a year later. One result of all this is that he spent the war years safely in Canada, while his mother and sister in England, endured the blitz, coming to North America only at the end of the war. Thus does the world move in its mysterious ways.

He was immediately hired as a lecturer in mathematics. In these post-war days, McGill had to expand rapidly to make room for returning veterans and one way it dealt with the problem was by opening a satellite campus in St. Jean. Getting there was his responsibility. Jim told me that once he missed the train for reasons beyond his control and skipped the class. The chairman told him he should have taken a taxi—at his own expense of course. This would have cost $10. To put this in modern terms, you should probably figure about $200.

In 1950, he completed his Ph.D. under Hans Zassenhaus and was promoted to assistant professor. In those days, assistant professors taught at least 12 hours a week and were not expected to do much, if any, research. I had been under the distinct impression that Jim had published little or nothing during the ensuing decade, but when I actually looked at his CV, I was surprised to discover that he had 14 publications between 1951 and 1959!

Half of those papers were joint with Leo Moser and appear to be combinatorics and elementary number theory. However, even in those early days he had begun research on several of the areas of mathematics that would occupy the rest of his career. In 1958, he published his first paper on the syntactic calculus, which continues today to occupy him (or, perhaps, once again occupies him) as well as his first paper on rings of quotients.

Although there were two more publications in mathematical linguistics in the following three years, he appears to have abandoned the subject for over a dozen years. But the world didn't abandon the subject and a small but lively group of researchers, mainly in Europe, developed the subject of "Lambek grammars", of which we will hear more this afternoon. In North America, Chomskian grammars, which originally relied heavily on grammatical transformations, won the day. This was the notion that a "deep structure" is generated and then "transformed" by movement rules into a "surface structure". In this view, a passive sentence, for example, has the same deep structure as the corresponding active sentence and the passive is created by a rule that transforms the active into the passive. Although superficially attractive, this rule proved impossible to formulate precisely. More importantly, it was observed (although it should have been obvious) that, in English at least, the same rules that generate the active mode will also generate the passive.

Almost unnoticed at the time was a short paper in the Canadian Mathematical Bulletin, "How to program an infinite abacus". This paper described a theoretical computing engine, which he called an abacus, that is much simpler conceptually than a Turing machine, but is Turing complete. It is very easy to program; unlike a Turing machine, it is obvious how to build in subroutines and has been heavily used by Yuri Matjesevich and others to study recursive function theory. Matjesevich called them Minsky machines (after Marvin Minsky, who discovered them independently), and I used to call them Lambek machines. Following Matjesevic, who tracked down all the discoveries and rediscoveries, of which there were several, all at the same time, I now call them register machines. I do not understand why computer theorists still burden their students with Turing machines, when this vastly simpler alternative is at hand.

Jim then turned his thoughts for most of a decade to ring theory, particularly to rings of quotients. He published many papers on the subject, culminating in the very successful and influential book, *Lectures on Rings and Modules*.

In the meantime, Jim spent his sabbatical year 1965–66 in Zürich at the Forschungsintitut für Mathematik der Eidgenössische Technische Hochschule where Beno Eckmann had gathered together a group of people interested in algebraic topology and, incidentally, category theory. Bill Lawvere was spending that year (and part of the next) there and, doubtless under that influence, Jim got interested in categories. When I arrived in Zürich in the winter of 1967, I was handed a copy of LNM #24, *Completion of Categories*, by one J. Lambek. I have to admit that I had never heard of him, although the ring theory had led him to dabble a bit into homological algebra which is what I was doing at the time. At any rate, the year spent in Zürich appears to have reoriented his research into category theory as my six months there seems to have done for me.

I finally met Jim at a meeting of the "Midwest Category Seminar", a series of meetings held over a six or seven year period mainly in Chicago sponsored by Saunders MacLane. At that time, I was looking to escape from Urbana, we had a short discussion and the rest is history. In 1968, Jim published a paper called "A fixpoint theorem for complete categories", in which he extended to categories a fixed point theorem well-known for posets. This small, beautiful, theorem turns out to have been extremely important in some of the applications of category theory in computer science. Once again, Jim was the first person to make a small but extremely important observation.

During the 1970s, his researches combined ring theory, torsion theory and category theory, much of the latter in collaboration with Basil Rattray. During this decade, he renewed his interest in mathematical linguistics, studying formally verb conjugations in French and Latin. As well, he began to show an interest in applications of category theory to logic. This last interest resulted in a fruitful collaboration with Phil Scott that culminated in a book, *Introduction to Higher Order Categorical Logic.*

In recent years, Jim has not slacked off; au contraire, I think he is publishing at a greater rate than ever. Aside from a few papers in categorical logic, one third of his recent work has been in linguistics, returning to the grammars of syntactic types. Just 10 days ago, he gave a very interesting seminar on the subject. As far as I can tell, he is now using ideas of modern category theory to reformulate and tighten the ideas first announced in the 1958 paper. As for the other two thirds of the papers, they include contributions to category theory, logic, philosophy, and physics. His total of publications has, as of last May, reached 107 and they are still coming. And these are papers that he has written or been a major collaborator to, not the kind common to so many areas of science, "It was done in my lab, my name goes on it—first".

Michael Barr
December 5, 1997
McGill University

This article may be accessed via WWW at `http://www.tac.mta.ca/tac/` or by anonymous ftp at `ftp://ftp.tac.mta.ca/pub/tac/html/volumes/6/bio/bio.{dvi,ps}`

THEORY AND APPLICATIONS OF CATEGORIES (ISSN 1201-561X) will disseminate articles that significantly advance the study of categorical algebra or methods, or that make significant new contributions to mathematical science using categorical methods. The scope of the journal includes: all areas of pure category theory, including higher dimensional categories; applications of category theory to algebra, geometry and topology and other areas of mathematics; applications of category theory to computer science, physics and other mathematical sciences; contributions to scientific knowledge that make use of categorical methods.

Articles appearing in the journal have been carefully and critically refereed under the responsibility of members of the Editorial Board. Only papers judged to be both significant and excellent are accepted for publication.

The method of distribution of the journal is via the Internet tools `WWW/ftp`. The journal is archived electronically and in printed paper format.

Subscription information. Individual subscribers receive (by e-mail) abstracts of articles as they are published. Full text of published articles is available in .dvi and Postscript format. Details will be e-mailed to new subscribers and are available by `WWW/ftp`. To subscribe, send e-mail to `tac@mta.ca` including a full name and postal address. For institutional subscription, send enquiries to the Managing Editor, Robert Rosebrugh, `rrosebrugh@mta.ca`.

Information for authors. The typesetting language of the journal is TEX, and LATEX is the preferred flavour. TEX source of articles for publication should be submitted by e-mail directly to an appropriate Editor. They are listed below. Please obtain detailed information on submission format and style files from the journal's WWW server at URL `http://www.tac.mta.ca/tac/` or by anonymous ftp from `ftp.tac.mta.ca` in the directory `pub/tac/info`. You may also write to `tac@mta.ca` to receive details by e-mail.