

## Bernd Fischer at Bielefeld — some recollections.

I was very reluctant to speak here. As some of you may know, I have withdrawn nearly completely from public mathematical life: no lectures, no reports, no conferences ... I am still interested in mathematics, at least in some small parts of mathematics. I do some research (and the family is happy: the grandfather is busy ...), but really just on a private level.

On the other hand, it seem to me important to honor Fischer, and clearly there should be a well-come address by one of his former colleagues. And not many are left. In addition: I have to admit that I owe very much to Fischer, so finally I felt that I had to accept this duty.

I cannot say anything about his research. But as you known there is the concentrated account by Mark Ronan which tells a lot about Fischer's involvement.

Bielefeld University started in **1969**, very different to the usual German universities. It was designed by Schelsky, a sociologist, with the focus just on two major subjects, namely sociology and mathematics (the remaining few subjects he considered as a sort of satellites); and as a kind of Graduate School, with alternating years for teaching and for research. (Actually, nine years later, when I came to Bielefeld, the latter rule was already abolished). The Faculty of Mathematics was planed by Hirzebruch from Bonn, and by Grothemeyer from Berlin, it soon had the nick-name **Faculty for Group Theory**; all the algebraists were interested in groups, but also outside of algebra, there was Waldhausen with interests in groups, there was Leptin dealing with Lie groups. Bernd Fischer was one of the first members of the Faculty.

I studied mathematics at **Frankfurt**, were Fischer came from. I remember very well his lectures on solvable groups, this was his main interest at that time. When I was looking for a PhD-supervisor, I actually asked him for advice. Finally, I decided to work in algebraic topology or better in category theory. On the other hand, I always tried to feel as a member of the large Frankfurt school of Reinhold Baer, but I finished my studies only at a time, when the Baer school already was dissolved, was spread over many continents, to America, to Australia.

**Baer** had a strong influence on all who stayed at Frankfurt. So I understood very well that Bernd Fischer often compared Bielefeld and Frankfurt. His saying "in Frankfurt, the problem would have been solved in the following way..." was well-known, and it always referred implicitly to Reinhold Baer. Actually, as you know, Fischer was usually very critical, he accepted only few authorities. But he clearly was impressed very much by Reinhold Baer; may-be not so much by Baer's mathematical interests in his last years which were devoted to very general properties of very general classes of groups ... As you know Fischer himself turned to look at very concrete questions, with an obvious contempt for general nonsense ...

Fischer's influence in the **faculty** was very strong and he directed many decisions. Of course, he was present at all the faculty meetings (at least as a half person: He usually was

standing at the entrance door, half in, half out: one arm in the corridor, with a cigarette in his fingers).

**Tits** once was invited for a colloquium lecture, he spoke about the Monster and its relevance. At that time, there had been established also an internal colloquium, and we asked Fischer to give an introductory lecture before-hand, so that we were prepared. But this did not work out as we expected. Tits began his lecture quite friendly writing down the order of the monster, pointing out the prime number factorization ..., whereas the preparatory lecture of Fischer started with some special group called  $.0$ , operating on some vector space... Everyone was lost from the beginning. The Tits lecture may have been a convenient preparation for Fischer's lecture, but not the other way round.

Fischer was always reluctant to **motivate** students. Dealing with students, he insisted that they must have an intrinsic interest in mathematics by themselves. He never would have dared to persuade them say to work in group theory. When the faculty organized introductory lectures for motivation, he did not participate in the program. This was then done by his assistants, but unfortunately, they stayed only a while at Bielefeld. In particular, the faculty suffered strongly when Stellmacher went to the United States. But then there was a new scheme by the government, to bring back young scientists who had left Germany. There was a strong desire by the whole faculty to bring Stellmacher back to Bielefeld. We got a new position, there was a strict hiring procedure (which would have been easier if Stellmacher would have declared himself to be a trans women), fortunately, several mathematicians from outside (say Remmert, and Brieskorn) supported the Bielefeld decision. Unfortunately, Stellmacher also got an offer to go to Kiel.

I had the impression that Fischer really would have liked to become **rector** of our university: to shape it according to his ideas. But this was difficult at Bielefeld with its many soft subjects. Of course, in order to become rector, you first should be prorector for some time. For strange reasons, he accepted to be candidate for becoming prorector not for research (which would have been the obvious choice), but prorector for teaching. And surprisingly, he did not see that this arrangement was really a trap...

He was part of a **network** on "Representations of Groups and Algebras" which was organized by Michler from Essen. Every year, one had to write a new application, as well as a report (usually very lengthy texts!). Fischer just refused to follow these rules. Very famous was his application for inviting Aschbacher: Just two lines written in pencil on a small piece of paper. So Michler tried very politely to ask him to expand this request at least slightly. He just refused: either the referees know the relevance, or else they are just not qualified...

And there was every year a meeting with the referees, at Bad Honnef. We had to prepare reports, provide lists of publications, and the referees asked their questions. There was a curious standard procedure: Fischer was working at that time at the character table for the monster, providing steps for the solution. These partial results are not published, and it was the custom that year by year one of the referees was supposed to challenge this. Thus, every year Fischer explained that these were intermediate results, which were, of course, available for anyone who wanted to work with them, but results which are no

longer of interest if finally the complete character table is known. As I said, this exchange of arguments happened every year: everyone did know it beforehand, everyone was curious which referee was supposed to address the question, and Fischer, of course, was prepared to answer.

Then came the final meeting with the referees. Before I continue, let me insert an appraisal for the research council, and, in particular, Robert Königs of the DFG who was in charge of the procedure. (At that time, the DFG was really still a very serious institution.) As you know, concerning research projects, a lot of paper is used, and usually all these texts are read by only a few persons, the administration and the referees, but otherwise they just are lost. But it was different at the end of our research network: Michler suggested, that the final reports were published as a Birkhäuser volume and Königs agreed. When Michler and me, as the editors of the volume, made a first outline of the volume, we guessed the number of pages for each of the reports: Aachen 30 pages, Mainz 20 pages, and so on. I remember, when we came to the name Fischer, Michler said: *let's say 15 pages, but be sure, we will not get them.* But Fischer wrote nearly 20 pages...

And then came the meeting with the referees... And, as usual, one of the younger referees (I will not mention his name!) felt obliged to ask the standard question, not being aware that Fisher **had** contributed a publication ... Not only Fischer was upset (he actually questioned his further cooperation with the research council). Geyer for example stressed that he already worked through the text, in his seminar at Erlangen ...

As you know, Fischer's **list of publication** is not very long. Thus, it was always fun to be in a hiring committee together with Fischer, when the candidates were ordered with respect to the number of publications. He did not mind, but of course it was clear that for him these kinds of ordering were only minor indications of quality.

Nowadays, with all the university **rankings**, only large lists matter. But clearly, Fischer never cared. Better: he strictly insisted that one should be careful what to publish. Of course, this creates a problem with any university administration, at least in case they cannot judge scientific advances and only care about quantitative measures.

Actually, when **Conway** accepted to come for a whole week in order to celebrate the 60th birthday of Fischer, with several lectures, public ones, scientific ones, there was the rumour that the university administration really was surprised: they were aware of the fame of Conway, say as the creator of the *game of life*, but apparently they were not at all aware of the fame of Fischer, as one of the highlights of Bielefeld university.

I was twice dean of the faculty, and both times I strongly had to rely on **his help**. Of course, concerning many questions. we had very different opinions. But still, there was no problem to ask him say how to approach the administration, how to formulate letters... But asking him for advice was sometimes quite curious, since seldom he would give a definite answer. Instead, he would refer to a similar situation, the decision which was made and the effect it had. (Usually, the effect was contrary to the expectation). But these case-by-case considerations were always very helpful, since they stressed side-effects which otherwise would have been overlooked.

I always was happy to listen to his arguments. His knowledge in mathematics, but also outside of mathematics, say in history, in philosophy, was tremendous. And I always was

reluctant to make comments. All the time, I felt more like a student... I remember only two occasions (in more than 50 years!) that I was able to provide some information he was not aware of. First, after some discussions of Fischer with Sandy Green on quantum groups, he asked me for further details. And second, once I even dared to challenge him (but apparently, he was not happy about it). For the 50th anniversary of the university, the faculty had arranged some interviews, they are still available on the home page of the faculty. I had made a list of some questions, and after the session, I asked Fischer one of the questions, since I felt that it relates to his work, as well as to my work, and since it really is part of classical mathematics.  **$27+1=28$** , is there some mathematical relevance? I have to admit, without further hints, a nasty question.

Thus, let me end with a bit of mathematics. Here are the hints: it is about the root systems  $E_6$  and  $E_7$ . The number 27 occurs as the number of lines on a smooth cubic surface, and 28 is the number of double tangents of a smooth plane curve of degree 4. Related is a lot of combinatorics, the 27 lines lead to the root system  $E_6$  (there are precisely 36 special subsets consisting of 12 lines). And the 28 double tangents are related to the root system  $E_7$ . That is 19th century algebra, see Weber's Algebra, volume II, but also later presentations say by Freudenthal and others. In this way, we see the relevance of the numbers 27 and 28. But what about the equality  $27+1 = 28$ ? There is a paper in the first volume of the Mathematische Annalen, 1869, by Geiser, which nicely relates the two problems, thus also between the root systems  $E_6$  and  $E_7$ . Take the tangent cone of a cubic surface in some generic point  $x$ , you get a quartic curve and the 27 lines on the surface together with the tangent plane in  $x$  give you precisely the 28 double tangents ...

Thank you for your attention.

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