

THIRTY YEARS AND STILL COUNTING

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As somehow typical for mathematicians, we first met at the Oberwolfach institute in the Black Forest in March 1975. We both participated in a workshop on partial differential equations organized by Erhard Heinz and Günter Hellwig and immediately saw that we had many mathematical interests in common (for example Hankel functions!). At the time, David was a guest professor at the University of Konstanz en route to taking up the chair of Applied Analysis at the University of Strathclyde in Glasgow and Rainer had a chair of Numerical and Applied Mathematics at the University of Göttingen. The fact that, on an invitation by Donald Pack and Gary Roach, Rainer had previously arranged to spend a sabbatical year at the University of Strathclyde in 1976/77 cemented the beginnings of our long relationship.

When Rainer and his family arrived in Glasgow in the fall of 1976 they stayed in the rented house previously occupied by David and his family. During the following year we got to know each other and our families and spent many enjoyable evenings and Sunday afternoons at each other's house as well as taking numerous excursions together in the great Scottish countryside around Glasgow. The fact that David's wife, Renate, was German facilitated the process of our families getting to know each other. During this time, we also wrote our first two papers together. Although they were on a topic from scattering theory, history has made its judgment on them and we will let them rest in peace. It became apparent that we worked well together and took mutual pleasure in our collaboration. This was due to a number of factors including similar mathematical tastes, mutual respect and working styles which valued frankness, punctuality and a sense of humor when things did not work out as we expected. As a result of the different state of the British and German economy in the 1970s, from a simple observation David drew general (and in Rainer's opinion not always justified) conclusions on how comfortable a German professor's life must be: for a malt whiskey at the university staff club David had to pay a considerably higher proportion of his salary than Rainer did.

The collaboration and friendship which was born in Glasgow continued when David moved to the University of Delaware. This was accomplished by frequent visits between Newark and Göttingen. As in Scotland, we again took pleasure in long walks in the countryside, particularly in the hills around Göttingen. In 1982 Rainer spent his sabbatical at the University of Delaware and it was during this time that the idea of writing a book together was born. We picked scattering theory as the main topic since, among some more profound reasons, both of us assumed that the

other was an expert in that area. Although we found that we were both mistaken in this assumption, writing our book *Integral Equation Methods in Scattering Theory* together was an ideal way to learn more about this field. Furthermore, because at that time neither of us was an expert in scattering theory, the book probably turned out to be more readable and digestible for physicists and engineers.

After our first book appeared in 1983, our research became more focused on inverse problems in scattering theory. We were attracted by inverse scattering problems both because of their importance in applications as well as the fact that their ill-posedness has many counterparts in everyone's personal life! By this time Peter Monk had joined the University of Delaware and Andreas Kirsch had completed his habilitation with Rainer (after spending a year with David at Delaware). Each of the groups at Delaware and Göttingen were developing their own different but complimentary approaches to inverse scattering theory. Slowly we began thinking about the possibility of writing a second book together focusing on inverse problems. We thought that putting all our new developments together into a book would be a useful and enjoyable task to do. Rainer's additional motivation for our second book *Inverse Acoustic and Electromagnetic Scattering Theory* was to deal with a severe personal loss, the death of Hildegard's and Rainer's son Marcus.

There are a couple of reasons why our friendship has survived writing two books together including a second edition of our second book. After reaching a general agreement on the material that should go into the books and on the notations to be used, we decided on how to divide the chapters between the two of us and, importantly, on a reasonable deadline that we also both kept. Knowing that we both have a similar mathematical taste, we then left individual freedom for each of us to write the assigned chapters accordingly without much interference from the other. Finally, of course, all chapters were given a final touch by reading and polishing them together in a number of sessions. In this final round, our friendship helped us to deal with mutual criticism on parts that needed improvement. For our second book we came back to our roots and performed the final polishing during a week at Oberwolfach.

We never seriously considered the possibility of writing a third book together. However, as time moved on, we became resentful of the pressure to write a research paper each time we visited each other. We were having a beer and discussing this problem in the summer of 2005 in Göttingen when Fioralba Cakoni (who was also visiting Rainer from Delaware) suggested that instead of a research paper we could write a survey article on a topic in inverse scattering theory in which we could also give some personal reminiscences of our role in the development of this field. We both thought that this was a great idea and the resulting paper appeared as a topical review in *Inverse Problems* in 2006. This is our most recent paper together. While Rainer, with the help of his secretary, prepared the \LaTeX file of this paper, David passed the time away by sitting as a model in the portrait class at the University of Göttingen that Hildegard was attending.

Not only did we benefit professionally from our collaboration and friendship but this benefit also extended to our personal life and the life of our families. Hildegard's and Rainer's daughter Wendy spent one year in 1990/91 as a high school student just on her own with a wonderful host family in Newark that the Kress family still has good contacts with. However, adding to the fact that this all happened at a very difficult time for the Kress family, major difficulties arose when at the outbreak of the first Iraq war Wendy was in need of talking to a person that was

not following the main stream of American support for George Bush. It was a great relief that, on a long walk through David's favorite walking area in Newark, Wendy had the opportunity to discuss her fears and anxieties with David and to realize that they were shared by other people. The anti war demonstration in Washington she participated later on with David and Renate as well as the editor in chief of this journal, among thousands of others, was an extremely important experience for Wendy.

Some ten years earlier, at the beginning of Rainer's sabbatical at Delaware in 1981, seven year old Wendy had also required help from the Colton family, this time from Renate's and David's younger daughter Natasha. In particular, six year old Natasha was needed to act as a translator between Wendy and her teacher at primary school until Wendy learned enough English to communicate on her own. Needless to say, Natasha felt very important and proud of her ability to carry out this obligation!

Later on, from 1995 to 1997, Renate's and David's older daughter Claire decided to study for two years in Germany and for this she chose the University of Göttingen both for the reputation of this university and because of the presence of the Kress family as a haven in case of an emergency. However, instead of any emergency, in Göttingen Claire met the love of her life, her future husband Hans.

When we first met each other in Oberwolfach in 1975 we were both young and ambitious professors. Now we find ourselves mysteriously transformed to senior and established experts in our field. Neither of us is exactly sure how this all happened or where all the years went so quickly but here we are. We both take pleasure in the fact that we have traveled this road together and have been able to combine friendship and mathematical research along the way. Our journey has been made particularly enjoyable by the friendships we have made over the years with many collaborators. Included in this group are the organizers of the conference in Sestri Levante which led to this special issue, Fioralba Cakoni, Houssein Haddar and Michele Piana, as well as the editor in chief of this journal, Lassi Päiväranta.

We are at an age where we can be expected to give advice to the younger generation. In this regard we have nothing profound to say except take pride in your work but recognize that there are other things in life which are more important, don't take disappointments too seriously and, perhaps most importantly, keep a sense of humor. We are looking forward to seeing this younger generation continue the growth and development of the field of inverse scattering theory, a field to which we have devoted so much of our life to and have received so much in return.

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