

Appendix A

Supplement

Gedenkworte für Rudolf Ahlswede¹

Rudi Ahlswede bin ich zum letzten Mal begegnet, als er am 30. Januar 2009 in Erlangen einen Festvortrag zur Nachfeier meines 80. Geburtstages hielt. Mathematiker wie Nichtmathematiker erlebten da einen Fürsten seines Fachs, der sein gewaltiges Souveränitätsgebiet begeistert und begeisternd durchstürmte und Ideen zu dessen fernerer Durchdringung und Ausweitung in großen Horizonten entwarf. Ich möchte noch kurz ein wenig über die “Anfangsbedingungen” berichten, die Rudi bei seinem 1966 mit der Promotion endenden Stochastik-Studium in Göttingen vorfand. Das Fach Stochastik, damals Mathematische Statistik genannt, war nach Kriegsende in West-Deutschland m.W. nur durch die Göttinger Dozentur von Hans Münzner (1906–1997) vertreten und mußte somit praktisch neu aufgebaut werden. Das begann mit der Übernahme neugeschaffener Lehrstühle durch Leopold Schmetterer (1919–2004) in Hamburg und Hans Richter (1912–1978) in München, die beide ursprünglich Zahlentheoretiker waren und sich in ihr neues Fach einarbeiteten. Dieser “1. Welle” folgte eine zweite, in der Jungmathematiker, wie Klaus Krickeberg (* 1929) und ich (* 1928), die in ihrem ursprünglichen Arbeitsgebiet bereits eine gewisse Nachbarschaft zur Stochastik vorweisen konnten. Bei mir war das durch Arbeiten zur Ergoden- und Markov-Theorie gegeben. Als ich 1958 in Göttingen das Münznersche Kleininstitut im Keller des großen Mathematischen Instituts an der Bunsenstraße übernahm, war ich für meine neue Aufgabe eigentlich zu jung und unerfahren. Ein Student, der damals zu meiner kleinen Gruppe stieß, konnte nicht erwarten, von einem souveränen, erfahrenen Ordinarius umfassenden Rat zu erhalten: ich hatte ihm damals nur einen Schritt der Einarbeitung in neue Themengebiete voraus. Meinen Zugang zur Shannon’schen Informationstheorie, auf die ich Rudi und andere “anzusetzen” versuchte, hatte ich über die Ergodentheorie gefunden, die mit der Einführung der Entropie-Invarianten (1959) durch A.N. Kolmogorov

¹This obituary was held during the conference at the ZiF in Bielefeld by Konrad Jacobs who died July 26th, 2015.

(1903–1987) und Y. Sinai (* 1937) einen mich unmittelbar betreffenden Bezug zur Informationstheorie erhalten hatte, der in einem Uspehi-Artikel (1956) von A.Y. Chintchine (1894–1995) schon vorher systematisch ausgebreitet worden war; da diese Arbeit in Ostdeutschland sogleich ins Deutsche übersetzt worden war, hatten wir hier sprachlich sofort Zugang. Wesentlichere Impulse für uns ergaben sich allerdings aus dem Ergebnisbericht *Coding Theorems of Information Theory* (1961) von Jacob Wolfowitz (1910–1981). Nach Rudis Promotion kam es zu intensiven Kontakten mit J. Wolfowitz, mit dem er später mehrere Arbeiten gemeinsam verfaßte, und dem er schließlich einen großartigen Nachruf widmete. Da ich Studenten wie R. Ahlswede und V. Strassen nur geringfügig “voraus” war, hatte ich später das beglückendste Erlebnis, das einem akademischen Lehrer zuteil werden kann: von seinen “Schülern” überholt zu werden und von ihnen lernen zu können. Auch nach der Erlanger Begegnung Anfang 2009 kam es immer wieder zu Telefonkontakten zwischen Rudi und mir. Bei einem der letzten (wohl 2010) schilderte ich ihm meine Erwägungen über die Frage, wie man sich als Mathematiker zu dem unvermeidlichen fachlichen Leistungsabfall - wie allmählich auch immer - nach der Emeritierung stellen solle. Ich hatte mich dafür entschieden, dann (bei mir nach 1993) nicht mehr forschungsaktiv zu sein, sondern mich anderen Interessengebieten zuzuwenden, wenn auch naturgemäß auf nunmehr amateurhaftem Niveau. Als ich ihn um seine Meinung hierzu fragte, kam die Antwort sogleich und in aller Entschiedenheit: seine Devise sei

Stirb in den Stiefeln!
(Die in your boots!).

Bei seinem Naturell kam nur in Frage, weiterzuarbeiten, so intensiv und so lange es nur angehen mochte. Rudi hatte noch eine Überfülle von Ideen und Problemen. In den Stiefeln, die ihm angewachsen waren, wäre er noch sehr lange weitermarschiert. So einen wie ihn vergißt man nie.

Commemorating Rudolf Ahlswede²

The last time I met with Rudi Ahlswede was in Erlangen on January 30, 2009, when he gave a lecture in honor of my 80th birthday. Mathematicians as well as non-mathematicians experienced a ruler in his field, one who stormed through his tremendous sovereign territory, inspired and inspiring, creating ideas, to which he penetrated and expanded upon to great horizons. I would like to say a little about the initial conditions that Rudi found himself in when he finished his Ph.D. program in stochastic studies in Göttingen in 1966. At the end of the war, the field of Stochastics in West Germany (at that time called Mathematical Stochastics) was, to my knowledge, represented only by one lecture position that was held by Hans Münzner (1906–1997) in Göttingen, and therefore had to be rebuilt practically from

²This obituary is the translation of the German obituary by Konrad Jacobs.

new. This began with the acquisition of two newly created institutes; in Hamburg by Leopold Schmetterer (1919–2004) and in Munich by Hans Richter (1912–1978), both of whom were originally number theorists and trained themselves in their new field. This first wave was followed by a second, in the form of the young mathematician Klaus Krickeberg (* 1929) and myself (* 1928); both of us originally came from areas of study that were in close proximity to the neighboring field of Stochastics. In my case, this was established through my work on Ergodic- and Markov Theory. In 1958, when I took over the Münzners' Klein Institute in Göttingen in the basement of the large mathematical institute in Bunsen Street, I was really too young and inexperienced for my new duties. A student, who at that time fell into my small group, could not expect a confident, experienced professor to give him comprehensive advice; compared to him, I was only a small step ahead in being familiar with the new topics. My approach to Shannon's Information Theory, to which I tried to push Rudi and others into researching, was made via Ergodic Theory. This, along with the introduction of entropy invariants (1959) through A.N. Kolmogorov and Y. Sinai, had, for me, a directly relevant connection to Information Theory that had already been widespread by an *Uspehi* (Advances in Physical Sciences) article (1956) by A.Y. Chintchine (1894–1995). This work, have been done in East Germany and translated into German, was immediately accessible because of the language. A crucial impulse for us however, came from the report, "Coding Theorems of Information Theory" (1961) by Jacob Wolfowitz (1910–1981). After Rudi finished his Ph.D., there was much contact with J. Wolfowitz and together they wrote many papers. Later, Rudi wrote a wonderful commemorative tribute to him. Because I had students like R. Ahlswede and V. Strassen, who I was only marginally ahead of in terms of research, I had the most exhilarating experience that a teacher can have: to be surpassed by their students and to be able to learn from them. After the meeting in Erlangen at the beginning of 2009, Rudi and I continued to have contact via telephone. During one of the last conversations (around 2010), I described to him my deliberations on the question of what a mathematician should do about the inevitable decline in performance – no matter how gradual it might be – and how one should position himself as a retired professor. I had decided then, starting around 1993, not to actively pursue research, but to turn to other areas of interest, which would naturally be on an amateur basis. When I asked his opinion of the matter, the answer came back immediately, with total resolve. His motto was

Die in your boots!

With his personality and temperament, it was only a matter of continuing to work as intensively and so long as one could. Rudi had a profusion of ideas and problems to solve. In the boots that he had grown into, he could have walked many more miles. You never forget a person like Rudi.

Comments by Alon Orlitsky

Rudi Ahlswede was truly a great information theorist. Not only did he make fundamental contributions to classical information theory, but he was also one of the first to explore the close connection between information theory and combinatorics. In addition, so many of his papers propose new problems, introduce new techniques, describe new results, and provide new insights.

To check how much I appreciated Rudi's research I resorted to a low-tech approach. Back in the old days there was an easy way to decide how much you liked someone's work: you went to your file cabinet and saw how many of their papers you had. When I did that, I found a folder going from C to E, one from F to H, and then I to K, and so on - but when I looked at the A's there was one folder devoted to just "Ah" This folder had one paper by Al Aho, but the rest were by Rudi.

Of these papers, one of those I like most is "Coloring Hypergraphs - A new Approach to Multi-User Source Coding", which, I know, Ahlswede was very proud of. When you look at it, it's not exactly summer reading, unless you plan to spend the whole summer reading it. Rudi actually said that he wanted to write an elaborate paper but decided to keep it "short". In spite of the "brevity" of the paper - there are a lot of interesting and very useful results, and some of them I subsequently used.

Rudi himself used to joke (or not) that he thought that all results on combinatorial information theory were in this paper - just, that people didn't have the patience to find them. So, I wish that Rudi stayed longer with us and I wish that more of us had had the patience to read more of this and his other papers.

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