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Remembering Wim Vervaat

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Wim Vervaat (1942–1994)

Wim Vervaat was at the height of a very successful mathematical career, but also in the middle of an unsurmountable personal crisis, when he, in his own words, “decided to die on the 31st of January 1994”. His death not only shocked his many friends and colleagues, but also made us realize how little we know each other and how little we can do for one-another. Our sympathy is with Marijke, Wim’s wife for many years, and with their daughters Sietske and Willemijn.

I (F.S.) came to know Wim when in the late sixties and early seventies we were two of four Ph.D. students writing their theses under supervision of Theo Runnenburg; the other two were Laurens de Haan and Guus Balkema. We used to report on our

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work in the Amsterdam Probability Seminar, and since then I have always thought of us as a kind of foursome, even if we did not collaborate on a regular basis. We had similar interests and parallel careers, and there was something self-evident in our relationships.

Wim was a keen, gifted and ambitious mathematician. His enthusiasm was overwhelming; before delivering a talk he would not be nervous, like most people, but rather agitated, eager to share his discoveries with the audience. When given the floor he would jump around, smiling broadly in amusement about the mathematical ideas he was unfolding. His talks were a delight for colleague and layman alike, although his lectures for students were found demanding.

In private discussions Wim used to switch back and forth between utter precision and intuitive imagery. Many of the sentences he spoke on such occasions were complete like theorems, and he would not tolerate omissions on the part of his partner in the discussion. Wim was easy to work with, serious, patient and helpful, yet he always kept his distance; at times he seemed caught between ambition and a kind of modesty. At the time of his death, Wim was collaborating with five or six people, thus leaving a number of papers unfinished. In preparation of this Volume, we have asked some of his co-authors to finish these papers, and publish them here. We are grateful to the five colleagues who made this effort.

Mathematical work

Wim's publications came in bursts. He published several papers before finishing his Ph.D. thesis, some quite unrelated to it. One of the theorems in his thesis, connecting the asymptotic behaviour of functions with that of their inverses, now goes under the name of 'Vervaat's Lemma' and is widely used in the theory of empirical processes. After his thesis there is a gap in his publication list coinciding with the period when the children were very young. In the subsequent years he became increasingly productive; he wrote more than half of his papers in the last ten years.

Wim's main interest was the general abstract structure of probabilistic phenomena. He did not so much strive for generality for its own sake but rather he wanted to get down to the essentials, and out to the boundaries of the problem at hand. A clear example of this is the paper [11] of 1982 on discrete self-decomposability, where minimal conditions lead to elegant maximal results. The generalized 'integral fraction' operator introduced by Wim in that paper has repeatedly been used by others (for instance Tony Pakes, *Stoch. Proc. Appl.* 55 (1995) 285–300).

However, concrete problems and even exercises also were a strong source of motivation for him; this shows in his early papers in *Statistica Neerlandica* (in part with Runnenburg) and in the numerous solutions he contributed to the Problem Sections of this Journal, and of *Nieuw Archief voor Wiskunde*.

One of his most interesting papers is [9], on stochastic difference equations and infinite divisibility, which has been a source of inspiration to many, and has led to joint papers with van Harn, Wolfe, Steutel, Jurek and O'Brien.

In the eighties his interest focused on three topics: self-decomposability, self-similarity, and large deviations. Self-decomposability, usually in an extended or non-standard sense, plays a role in several papers: in a discrete sense in [11], in the supremum sense in Gerard Gerritse's thesis. A Banach space extension occurs in [12], the starting point of a comprehensive work on self-decomposability done in collaboration with Bjørn Hansen. A brief account of self-decomposability in this very general setting is given in Hansen's contribution to this issue.

Self-similar processes were a popular subject in the eighties. Like percolation it was stimulated by its relevance for mathematical physics. In this area Wim's longlasting collaboration with George O'Brien started. Also, self-similarity spurred Wim's interest in physics, making him one of the initiators of the Mark Kac seminar for probability and physics, and the Dutch Association of Mathematical Physics.

In Nijmegen he built up a collaboration with the department of medical physics on the subject of point processes, which led to his co-supervising the Ph.D. thesis of Gerard Hesselmans.

Wim's final great interest was large deviations. On this subject he continued and intensified his collaboration with O'Brien, and worked with Norberg and Deheuvels, among others. On June 15, 1995 Bart Gerritse defended his thesis on Large Deviations that Wim had started supervising. An account of Wim's work on large deviations is given in the contributions by O'Brien, Deheuvels, Holwerda and Bart Gerritse.

If no suitable tools were available, Wim did not hesitate to develop them when they were needed. An example is his study of upper semicontinuous functions in the context of capacities. His interest in capacities originated in the work of Norberg, who had linked capacities to supremum measures, used by Wim in the study of extremal processes. Joint work with Norberg, Gerritse and Holwerda appears in a CWI tract [29] (1996). In the present issue some fruits of Wim's work on capacities and lattice theory are presented in Holwerda's contribution.

It is difficult to do justice to Wim's work without going into the details. His work is both broad and deep, it has the intuitive appeal of applied probability, and the thoroughness of pure mathematics. He influenced others through his work, without actually working with them, as we were told by several colleagues. The essence of his mathematical qualities will become apparent from the contributions in this issue, which give an overview of the areas in which he was participating enthusiastically until the very end.

It is his open-minded enthusiasm that we will miss most, both in matters of mathematical probability and in many areas outside mathematics.

Career

Wim Vervaat was born on July 15, 1942 in Velsen, a small town west of Amsterdam. In 1960 he finished 'Gymnasium β ' (highschool with Latin and Greek), and he obtained his Master's degree in Mathematics with Physics at the University of Amsterdam in 1967. In the same year he married Marijke Plantema. Even before

defending his Ph.D. thesis in 1972, he obtained tenure in Amsterdam. The children, Sietske and Willemijn, were born in 1974 and 1976; in 1975 the family moved to Nijmegen, where Wim was appointed associate professor ('Lector') at the Mathematics Department of the Catholic University, a position that was later turned into a full professorship. In the academic year 1981/1982 the family lived in Ithaca, New York, where Wim was on sabbatical leave at Cornell University. He also spent one year at the Technical University of Delft.

Wim was one of the initiators of the Seminar on Probability and Physics, later baptized the 'Mark Kac seminar', and he helped found the Dutch Association for Mathematical Physics, of which he was the chairman from 1986 to 1990. He was an editor of the *Journal of Applied Probability*, associate editor of the *Annals of Probability*, and was involved in a book series on probability theory of Oxford University Press.

In 1992 Wim decided to accept a position at the Université Claude Bernard in Lyon, France, leaving his family in Nijmegen.

Under his (co-)supervision seven researchers obtained their Ph.D. degrees: MICHEL DEKKING in 1980, HENK VANDEN BOOGAARD in 1985, GERARD HESSELMANS and BJØRN HANSEN in 1988, GERT NIEUWENHUIS in 1989, GERARD GERRITSE in 1990, and HENK HOLWERDA in 1993. BART GERRITSE was working on his thesis at the time of Wim's death, and finished it in 1995.

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