

WYLLIS BANDLER: Obituary

Wyllis Bandler, Professor of Computer Science and Director of the interdisciplinary Institute for Cognitive Sciences at Florida State University, died on December 22, 1995 in Tallahassee. He was born on July 3, 1916, in White Plains, N.Y., the son of Dr. Samuel Wyllis Bandler, a prominent gynecologist and rare book collector. He attended Franklin School in New York City and Horace Mann; after a year at Princeton, he transferred to Columbia University, graduating with honors in 1937 with a B.A. in General Studies. He went on to earn an M.A. in Economics from Columbia University (1938), and an M.S. in Meteorology from New York University (1943). He did his Ph.D. research in Mathematics at the University of Zurich under the guidance of the "father of modern algebra", B.L. van der Waerden (Ph.D thesis with distinction 1962). Since his time in Zurich, Wyllis Bandler's interests have always been in the application of algebraic structures to real life situations. He was also an accomplished linguist, being fluent in German, Italian and Spanish, apart from the artistic mastery of his native language, and his active knowledge of other languages he was too modest to mention.

During World War II, he joined the U.S. Army Air Corps, in which he rose to the rank of captain, and served with the 10th Weather Squadron, operating out of Kunming, China.

Professor Bandler made significant contributions in the fields of mathematics, computer science, artificial intelligence and applications of computing and mathematical modelling to various branches of science (including social sciences and linguistics) and technology. He published over 90 scholarly papers and 5 books. He was professionally active until the very last days of his life. In Fall 1995, he was the PI on a grant from National Research Council, and a Co-PI on an NSF research grant (\$240,000) supporting collaboration with Pratt & Whitney entitled "Decision-Making with Incomplete Information in an Integrated Product and Process Development Enterprise". His latest book "Tracing Chains-of-Thought: Fuzzy Methods in Cognitive Diagnosis" (jointly with Dr. B.A. Juliano) published by Physica Verlag (a branch of Springer Publ.) will appear in March 1996.

The defence of his last student was scheduled for the 3rd week of December and had to be unfortunately postponed due to his terminal illness.

For his sustained effort of the use of mathematics, science and technology for improvement of quality of human life, Wyllis Bandler received a special award from International Institute for Advanced Studies in Systems Research and Cybernetics in recognition of "Lifelong Scholarly Achievement". It was presented to him in August 1994 at the Internat. Conference on Interdisciplinary Research and the Second Orwellian Symposium (sponsored by IAS and UNESCO),

held at Carlsbad, Czech Republic.

Wyllis Bandler was recognized as one of the world leaders in mathematical and computational aspects of Fuzzy Sets, Logic and Systems. In 1993, a Festschrift in honor of his birthday, edited by Lotfi Zadeh, Fellow of the National Academy of Engineering, Professor Emeritus at the University of California, Berkeley and the originator of fuzzy set theory, was published on the occasion of the World IFSA Congress held in Seoul, Korea, in a special issue of the Journal of Fuzzy Logic and Intelligent Systems. Contributors included renowned American, European and Asian scholars from the fields of mathematics, medicine, science and technology.

In addition to international prizes received for his theoretical and applied work, he was also awarded King-Sun Fu Certificate of Appreciation from North American Fuzzy Information Processing Society in 1986. His expert judgement and calm negotiating ability have helped to increase the international and interdisciplinary reputation of the field of fuzzy sets and systems and is appreciated world-wide.

Dr. Wyllis Bandler was a founding member of the editorial board and Associate Editor of International Journal Approximate Reasoning and a member of the editorial board of International Journal of General Systems. For a number of years he was a member of the Board of Directors of the North American Fuzzy Information Processing Society; from 1987 to his death a member of the directors of International Institute for Advanced Studies in Systems Research, Informatics and Cybernetics (IIAS-SRIC). The unique breadth and depth of his interests is witnessed also by his activities in other professional and scholarly societies. He was also a member of London Mathematical Society, the American Mathematical Society, the American Association for Artificial Intelligence, the Cognitive Science Society, the Society for General Systems Research, the Association for Computer Machinery, the Institute of Electrical and Electronic Engineers, and the International Fuzzy Systems Association.

Professor Wyllis Bandler was an expert teacher and careful supervisor, and is held in great esteem by students and faculty alike. He lectured on the design of knowledge-based systems with particular emphasis on handling of incomplete and imprecise information, as well as on formal aspects of relational specification of knowledge-based and other information processing systems to undergraduate and graduate students. Graduate students from all over the US, other countries of the American continent, Europe and Asia obtained their MS and Ph.D. degrees under his expert guidance over the years.

Wyllis Bandler's intellectual legacy spans over several disciplines: mathematics (algebra) and its applications, computer science, cognitive science and artificial intelligence.

In early 1970s he became a founder of the Cognitive Studies

Centre, University of Essex, U.K. together with three other distinguished scholars, Dr. Yorick Wilks, Dr. Mike Brady (currently a Professor at Oxford University) and Dr. Patrick Hayes. Essex was one of the three major centres in Artificial Intelligence in U.K., others being at University of Edinburgh, and University of Sussex. After considerable time spent in teaching and research in the Mathematics Department of the University of Essex, U.K., he moved to Florida State University (1983), where he was a professor in the Department of Computer Science. He was a founding member and until his death the director of the Institute for Cognitive Sciences at FSU, an interdisciplinary institute in activity of which number of scholars participated, including logician and philosopher of world-wide renown Dr. Jaakko Hintikka, Professor Emeritus at FSU, and currently professor at Boston University.

Since his time in Zurich, Wyllis Bandler's interests have always been in the applications of algebraic structures to real life situations. Among his seminal contributions towards new knowledge representation structures for computational purposes is the formal development of theory of L-categories, an extension of the classical mathematical category theory. This research interest conceptually subsumes AI extended semantic networks, indicating that he was often well ahead of his times. Although L-categories can be isomorphically embedded into the structures formed by classical categories having functors operating over them as pointed out by Saunders MacLane, one of the creators of the classical category theory, L-categories are conceptually richer in general. They are superior in situations where one is interested in capturing emergent structures, the structures in which new properties are created through interaction with some of the other existing structures. In this aspect, the relationship of L-categories to classical categories resembles that of Peter Vopenka's Alternative set theory to classical Cantorian set theory.

Although his research interests began in "abstract" algebra it rapidly progressed to its burgeoning new applications in fuzzy relational theory and fuzzy implication and their use in knowledge-based systems of the human-machine-team kind. This is typical of his whole career to date, which has focused on mathematical structures called relations, not only from the theoretical point of view, but also on their practical applications.

Here he has pioneered the development of the theory and application of fuzzy relational products jointly with Dr. L.J. Kohout. These mathematical products are called BK-products in the literature. Within knowledge engineering he specialized in knowledge elicitation and representation, particularly in connection with citizens' interpretation of their urban surroundings (jointly with architect Dr. V. Mancini), and people's feelings about their medical needs. Until his last days he continued to develop the theory of crisp and fuzzy relations on which he started to work 17 years ago when at Essex (jointly with Kohout, then at University College, London U.K., now professor at FSU). This initially purely theoretical work is increasingly showing itself to be of the greatest utility in a number of applications to medical diagnosis, information retrieval, environmental studies (a current research grant from the National Research Council), industrial engineering (a current NSF research grant) and a number of other fields.

[This obituary was prepared by Professor Ladislav Kohout at Florida State University, January 1996.]

Our dear colleague and friend Wyllis Bandler passed away on December 22nd after a longer illness. Wyllis had a great number of friends among colleagues and former students, and he was extremely grateful to all those who called or wrote to express their concern during his illness.

We remember Wyllis for his many contributions to both theoretical and applied fuzzy sets (among many other works the 'Checklist Paradigm' by Bandler & Kohout).

Above all we remember him for his friendliness, compassion and readiness to help.

The fuzzy community has lost a great man and a great mathematician.

I understand that Wyllis managed to write a book before he left us for good. The book will appear in J. Kacprzyk's series 'Studies in Fuzziness', Springer-Verlag.

Our deepfelt condolences to his good friend Vasco Mancini who helped and cared for him during his illness.

Ellen Hisdal