Remembering Dave Waltz (1943–2012)

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n a Letter from the Editor in the last issue, I expressed our great sadness at the passing of David L. Waltz, a member of our advisory board and a great friend and longtime supporter to many of us here at *IEEE Intelligent Systems*.

It is difficult to summarize the achievements of his long career, of which there were so many; he was a brilliant scientist, a pioneer in computer sciences and artificial intelligence, and an inspiration to many others. He began at MIT, completing all of his degrees there in electronic engineering. Already, his work had an impact: Dave's PhD dissertation, *Generating Semantic Descriptions from Drawings of Scenes with Shadows*, originated the field of constraint propagation, which made it possible for computer programs to generate detailed 3D images from 2D drawings with shadows.

After serving as a graduate research assistant, Dave began his career as a teacher; in 1973 he became a professor, teaching electrical and computer engineering at the University of Illinois at Urbana-Champaign and, later, computer science at Brandeis University. But it was at the Thinking Machines Corporation where he achieved his second breakthrough in the field. In 1984 the supercomputer was just beginning to realize the full processing power of machine thinking, and TMC was one of the first companies to employ fast-working, massive amounts of RAM. There, while serving as the director of advanced information systems, Dave created the original field of memory-based reasoning. It was a creation that revolutionized AI and laid the technical foundation for the success of Google today.

His most recent research interests at Columbia University dealt with the application of machine learning to electric power grids, an emerging field that will revolutionize our world again in the near future.

His professional career and research had no less an impact, and in his career he accumulated an impressive number of accolades, advisory board memberships, research endeavors, professorships, and distinguished honors. The list is overwhelming.

I first met Dave at our 2006 editorial meeting. Since then, he offered many words of advice and was always kind and supportive to my research and editorial work. I cannot forget that last August, while he was seriously ill, Dave took the time to write a letter of support for me. Yes, he was really a generous and wonderful man.

Perhaps the best way to remember him would be to hear from those he affected. So, in celebration of David L. Waltz's life, I have collected a few words from some of members of the *IS* family who were kind enough to share some memories both big and small.

Jim Hendler (Editor in Chief, 2005–2008)

There is a saying that "It takes a village to raise a child," and it is probably true. It is also true that it takes a "village," in the sense of many mentors and guides, to raise a scientist. David Waltz was one of the most important people in my personal village.

Dave was one of the kindest and gentlest people it was ever my pleasure to meet. From the first time we started working together, he was always able to provide critical advice without making it hurt, and in a way that was truly constructive. My thesis work was better for his participation in my committee. He helped me learn to go from rejections to acceptances, first on conferences and then later in journals, through small but crucial suggestions as to how my work was best performed. And when I eventually became the editor in chief of this publication, Dave was one of my most valued advisors. He was one of the judges of our first "AI's 10 to Watch" awards, volunteering his time because he was always interested in AI's up-and-coming young scientists.

Some of my last interactions with Dave were spent with him trying to explain a very subtle point about machine learning work to me. I won't reprise the issue here, but it related not to ML itself but to what it had to say about, essentially, the philosophy of what a scientific theory is. It took several discussions and some outside reading before I realized what a correct, and profound, point he was making, and by then it was too late.

I truly appreciated the gentle mentoring, the powerful advice, and the thought-provoking discussions he and I shared. He was one of a kind, and I will miss him more than I can say.

Nigel Shadbolt (Editor in Chief, 2001–2004)

The first book on AI that I read was The Psychology of Computer Vision, and it was the chapter by Dave on "Understanding Line Drawings of Scenes with Shadows" that made me realize how powerful AI could be. Here was a method that showed how systematic machine-based inferences could work out what objects and interrelationships existed in a visual scene. What was really elegant was the way in which constraints-rules that effectively ruled out some interpretations or supported others-were represented and managed. His work not only influenced a generation of machine vision researchers, it laid the foundations for constraint-based programming.

Dave's interests ranged widely, and he always thought deeply about the opportunities offered by both advancing technology and our understanding of human cognition. I recall a great conversation one evening when we had invited him to speak at a UK expert systems conference in London-it was around the opportunities offered by the connection machine, a highly parallel architecture programmed in Lisp. Dave was looking at how it could be used in natural-language processing. This was cutting-edge AI on cutting-edge hardware—Dave had a great sense of where the leading edge of the subject was at any moment in time. Many of his publications show this rare ability to provide overviews packed with insight into the key ideas and trends in AI, from data mining to parallelism, relevance ranking to natural language processing.



Figure 1. David L. Waltz, pioneering researcher and supportive colleague. (Source: Nigel Shadbolt. Used with permission.)

When I took over as EIC at IEEE Intelligent Systems, it was this overview of the subject that was so valuable. Dave's knowledge and network was second to none. His suggestions helped shape the board of advisors and the magazine's content. He valued deep theoretical insights but always sought a practical implementation. He absolutely believed that the best test of an elegant formulation was an encounter with a difficult realworld problem; his most recent work on machine learning methods applied to power blackouts and energy grid management is a great example of this philosophy. At editorial meetings, Dave was always a constructive and wise counsel-and he was always there. In truth, I can't remember an editorial meeting that he didn't attend, and the best of it was I got to buy him dinner (see Figure 1). That's when we were privileged to hear the history first-hand or Dave's reflections on where the field was heading.

Everyone who knew Dave will attest to his kind and thoughtful nature. You always had the sense you were in the presence of a thoroughly decent human being, someone who had made a real difference to our subject. He was the best kind of friend, colleague, and example.

Daniel E. O'Leary (Editor in Chief, 1997–2000)

I came to know Dave Waltz as an editorial creative force in AI while we served on the editorial board of IEEE Intelligent Systems. We had yearly board meetings to look ahead and determine which topics we should pursue as special issues. There was a high level of energy in those meetings as the group would propose and analyze many potential topics, and Dave was a key catalyst for new ideas. He had a unique sense about what would be important, how it would be important, and what the best approach would be to getting coverage on the topic. He understood both the theoretical basis and potential emerging applications, and he knew who had unique insights on those topics.

Dave was also a quality filter for the special-issue topics. In our meetings, we would come up with many potential ideas, so we also needed to prune out those that were not ready or those that did not fit. From my perspective, a topic had to pass the "Waltz interest test" before it could be considered as a legitimate specialissue topic.

Over the years, I had other opportunities to talk with Dave. When I had critical professional issues to discuss, I went straight to Dave. He would take the time to discuss the issue and provide potential solutions. Dave Waltz was a creative force in artificial intelligence, but he also was stabilizing force that supported those around him. He will be greatly missed.

Se June Hong (Member of the Editorial Board)

During the 1974-75 academic year, I was visiting the electrical and computing engineering department at the University of Illinois, on a "remote assignment" (sabbatical) from IBM, when I had the fortune of befriending a few beginning faculty members. One was David Waltz of the computer science department. During the early eighties, my own work moved in the AI direction, although not in David's line of work. Also, I started visiting the CS and ECE departments in Urbana annually as one of IBM's PhD recruiters. I would see David there at least once a year until he left Illinois. He was always enthusiastic about his students' work. This enthusiasm about technical progress, whether it was his own or someone else's, was part of David all the time I knew him.

While David was with the Thinking Machines Corporation, we invited him to IBM Research for a talk on memory-based reasoning. His excitement about new ways to make use of massive and parallel memory is still vivid in my memory. This happened to be one example of his own pioneering work.

Hundreds of colleagues have served under or alongside David in countless professional roles. I am sure all will agree that he has always been attentive, thoughtful, and kind in his deeds and comments. This was true whether he was the president of the organization or just a member of the board or a committee. When he led, he led with consensus, and when others led, he seriously participated and held to the decisions. David Waltz personified the adage, "A good leader is also a good follower."

David was a tall man in every sense of the word. We are thankful for his presence and influence among us. We thank his loving family for sharing him with us. We will fondly remember our friend David, his work, his enthusiasm, and his generosity.

Richard Doyle (Member of the Advisory Board)

Although I was not privileged to have David Waltz as an advisor or a close research collaborator, he did play a specific inspirational role in initiating my graduate-student career at MIT. I had been quite taken with David's work on constraint propagation in scene interpretation. I had done some simple extensions of that work using the Soma cube as a domain, which was a popular puzzle at the time. My work applied similar constraint-based reasoning to the challenge of interpreting which of the seven unique Soma pieces could be involved in seamlessly constructing a particular scene. I don't recall all the details now, but the punchline was the same: constraint propagation can be a surprisingly powerful way to drill down to unique interpretations.

I recall proudly bringing this work with me to a welcome event for new MIT graduate students where I was able to engage a few of the faculty, who of course knew David's work well. I was told later that I had made an impression. Many years after that, when I was lucky to have caught up with David over dinner with one of his former students, many of whom remained his lifelong friends, I was able to thank him properly for his inspiration and for the role he had played at the very beginning of my career in AI. ■

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