

# In Memoriam: Daniel G. Bobrow

*Johan de Kleer*

■ *Daniel G. Bobrow (1935–2017) was a research fellow at Xerox's Palo Alto Research Center and an early AI pioneer. Bobrow served as AAAI president from 1989–1991 and was a Fellow of AAAI and the Association of Computing Machinery (ACM). Prior to joining PARC, Bobrow was a vice president at BBN Laboratories, where we worked from 1965–1972. He won the ACM SIGOPS Hall of Fame Award for his contributions to the operating system TENEX. He also won the ACM Software System Award for his contributions to Interlisp. A celebration of his life was held on June 5 at the Palo Alto Research Center in Palo Alto, California.*

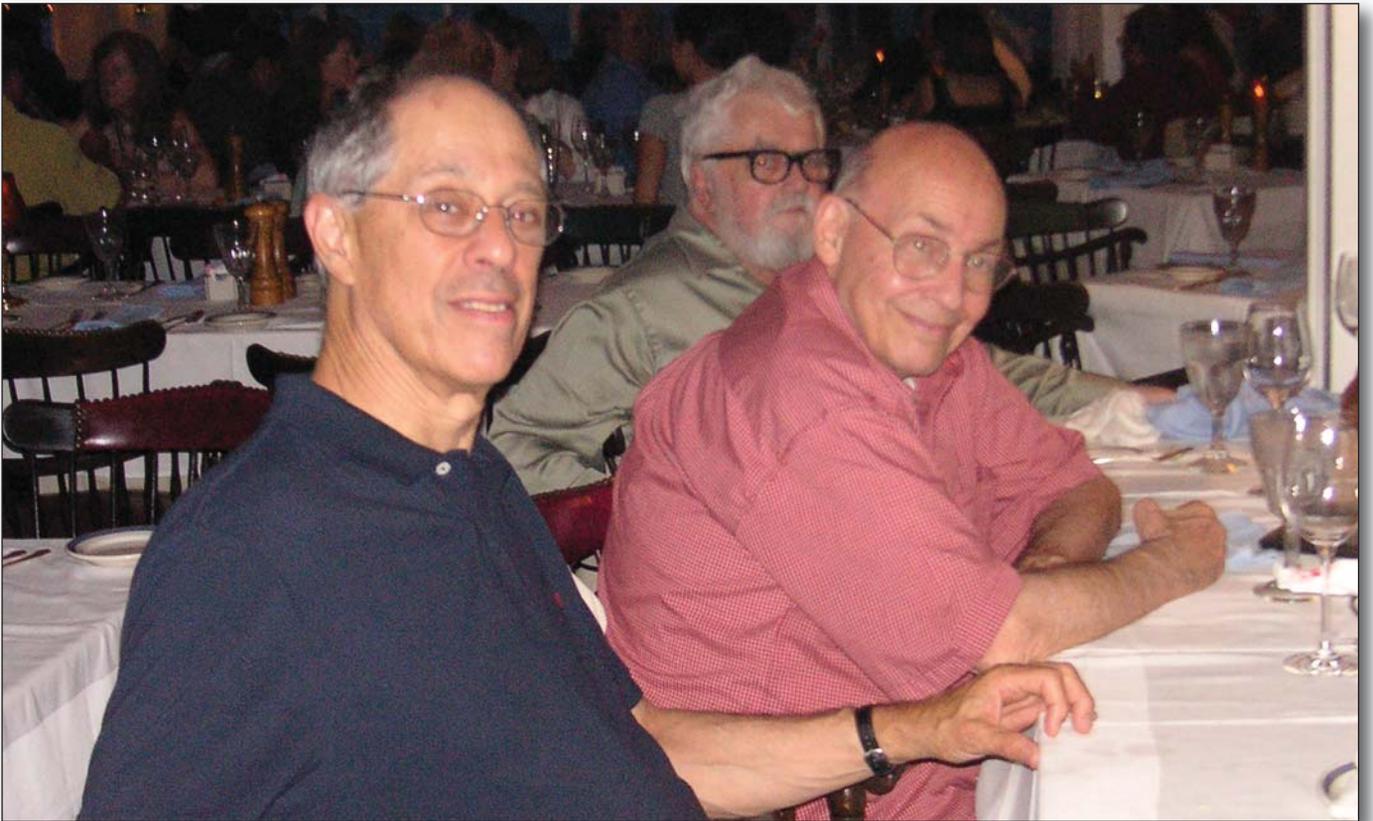
AAI Fellow and AAAI past-president Daniel G. Bobrow was born in 1935 in New York City. He attended the Bronx School of Science along with his close friend Bert Raphael, another AI luminary. From the beginning, Danny, as he was known, was a deeply intuitive thinker who would arrive at the conclusion to a problem or assignment before anyone else. Bert reports that when Danny and he did their college work together, Danny would leap to the correct answer, and Bert was left filling in the steps. This pattern repeated itself often over Danny's long career with many of his collaborators.

Danny completed his Ph.D. dissertation in 1964 at the Massachusetts Institute of Technology (MIT), where he published a thesis entitled Natural Language Input for a Computer Problem Solving System under Marvin Minsky. The thesis described STUDENT, a revolutionary program that could solve algebra word problems stated in English as found in high-school algebra textbooks. Danny's was one the first theses on natural language understanding — a topic that would remain a central interest of his throughout his long career. He also was one of the first students at what would later become the MIT AI Lab. The technical report describing his thesis was the first in a series of illustrious research results: Project MAC technical report: MAC-TR-1.

After graduating, Danny became an assistant professor at MIT for a year before moving in 1965 to nearby BBN



*Danny in Animated Conversation with David Israel (SRI). Both Had a Lot to Say.*



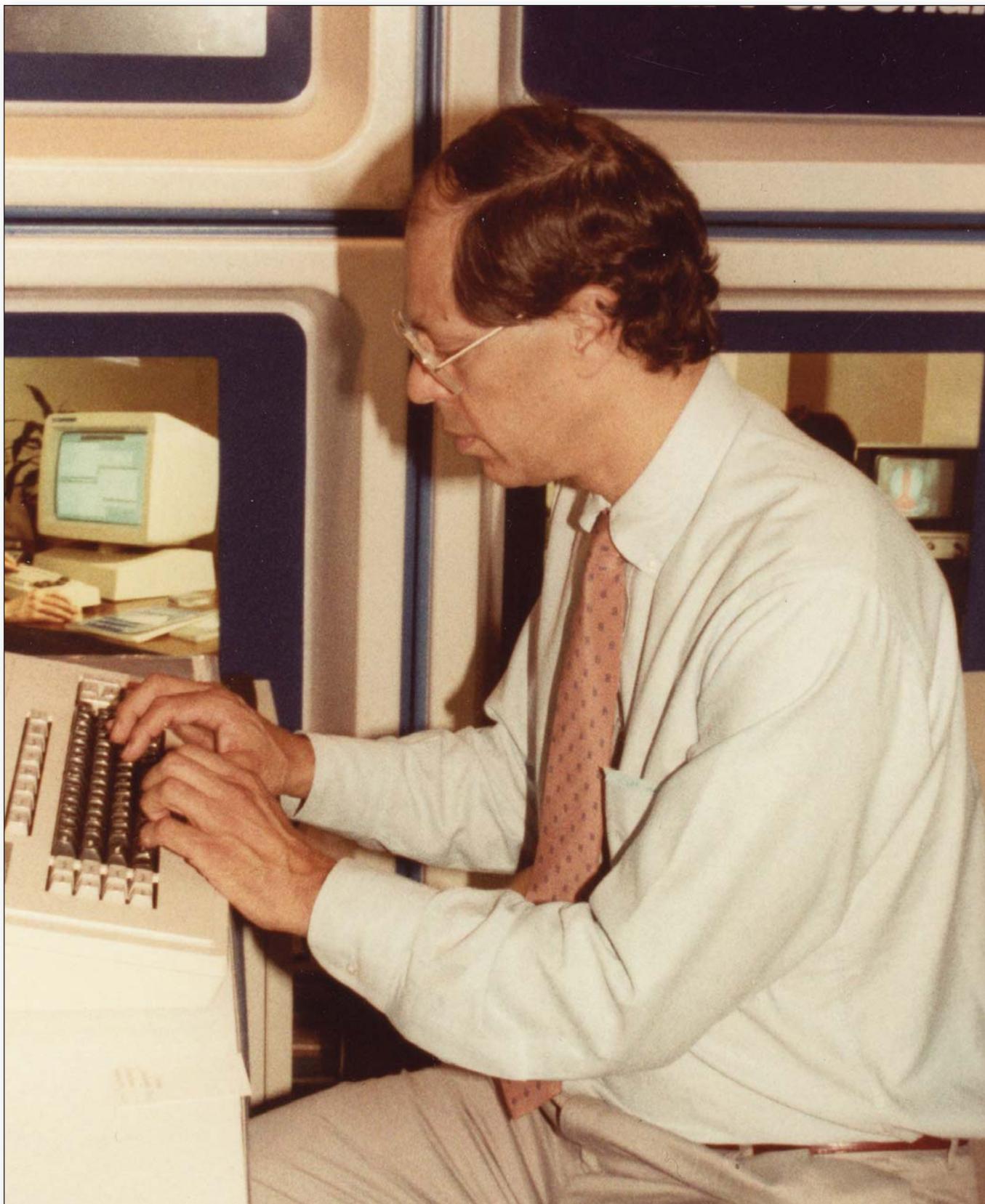
*Danny, Marvin Minsky, and John McCarthy at an AAAI Fellows Dinner Not Long Ago.*



*A Younger Danny in His PARC Office.*

Laboratories. During his tenure, BBN became a hotbed of AI research. By 1972 Danny had become the vice president of BBN's Computer Science Divi-

sion. It was during his time at BBN that Danny manifested the quality he is best known for: collaboration. His participation in any project made it dramatically



*Danny at the AAAI Conference Exhibit During the 1980s Demonstrating the Xerox Lisp Machine. (A Rare Picture of Danny with a Tie!)*



*Danny, Mark Stefik, and Sanjay Mittal Demonstrating Truckin' Knowledge Competition.*



*Danny, Gregor Kiczales, and Ken Kahn Discussing Metaobject Protocols in Gregor's Office at PARC.*

better, and his broad range of interests enabled him to participate in a wide range of projects. Danny helped develop and supervise the PDP-10 operating system TENEX, which was widely used in AI and Arpanet research. The TENEX development group won the ACM Special Interest Group on Operating Systems (SIGOPS) Hall of Fame Award in 2005. While at BBN, Danny contributed to BBN-Lisp, which later became Interlisp and contributed to Common Lisp—a language that many AI researchers use today. In 1992 the Interlisp team won the ACM Software System Award.

In 1972, Danny was awarded a Fulbright scholarship at the University of Edinburgh, which enabled him to return to working on natural language understanding. He then moved to the newly founded Xerox Palo Alto Research Laboratory as a Research Fellow. He worked at PARC for the rest of his life, where he continued his Lisp development with Interlisp. He also started working with Terry Wino-

grad and Richard Fikes on natural language. Terry and Danny developed one of the first frame-based knowledge representation languages: KRL. During this time, he worked with Mark Stefik on a collaboration framework, Colab, which was one of the earliest tools to support collaborative computer work. His book with Gregor Kiczales and Jim des Rivieres, *The Art of the MetaObject Protocol* was the first detailed discussion of meta-object protocols and is the basis of the object system used in most Common Lisp implementations.

Danny was a genius at fostering collaboration among his colleagues. He loved sessions of intense intellectual debate. In the middle of an intense debate he would yell out “Everyone change positions.” This meant whatever side you were arguing for, now argue against. It is a great technique for facilitating understanding of another’s position. If the person who had yelled out had been anyone but Danny, he or she would have been ignored. But Dan-

## AAAI/ACM Conference on AI, Ethics, and Society

February 2-3, 2018 \* New Orleans, Louisiana, USA

As AI is becoming more pervasive in our lives, its impact on society is more significant and concerns and issues are being raised regarding aspects such as value alignment, data handling and bias, regulations, and workforce displacement. Only a multi-disciplinary and multi-stakeholder effort can find the best ways to address these concerns, including experts of various disciplines, such as ethics, philosophy, economics, sociology, psychology, law, history, and politics. AAI and ACM have joined forces to start a new conference, the AAI/ACM Conference on AI, Ethics, and Society.

The first edition of this conference will be colocated with AAI-18 on February 2-3, 2018 in New Orleans. The program of the conference will include peer-reviewed paper presentations, invited talks, panels, and working sessions.

For more information, please see [www.aies-conference.com](http://www.aies-conference.com). Registration will be available via the AAI-18 registration site at [www.regonline.com/aaai18](http://www.regonline.com/aaai18).

ny could create safe spaces, and everyone did exactly what he asked them to. As a result, these meetings worked great.

While at PARC Danny had numerous leadership responsibilities in the AI community. He was the longest serving editor and editor-in-chief of AI's premier journal, *Artificial Intelligence*, from 1975–2001. During this time, it was my privilege to work with Danny, and I witnessed the care he took in making sure new authors could get their ideas published. He also personally helped improve many of the papers that were published in the *AIJ*, including articles written by future AAI Fellows.

In 1989, Danny was elected president of the American Association for Artificial Intelligence (AAAI). He served from 1989–1991. Danny was also very interested in cognitive science, which — at the time — was strongly linked to AI. He served as the chair of the Cognitive Science Society from 1985–1986.

More recently, Danny was a member of the natural language group at PARC, which brought him back to his first love: natural language understanding. After the group was spun out as Powerset, Inc. and eventually sold to Microsoft, Danny chose to remain at PARC and focus on research. Over the last years, I was Danny's manager — however, it was often unclear who was managing whom. His broad intellect, his positive attitude, and the collaborative spirit that guided him all his life made it a pleasure to

work with him. He mentored many a budding AI scientist. We miss him deeply.

In 2008, I had the honor of hosting a Festschrift (workshop) in Danny's honor at PARC. Don Norman, Patrick Hayes, Mark Stefik, David Israel, Kenneth Forbus, and Barney Pell participated. Serendipitously, it was held in the same auditorium where we held his celebration of life. Danny was very moved by that afternoon's talks and at the end he stepped in front of the auditorium and said "I want to thank all of you, because this room is filled with love and caring and intellectual ferment. And lots of fun people to argue with ... my favorite hobby. I hope to continue to do that for many years ...." That's Danny!

The celebration of Danny's life was held on June 5 at the Palo Alto Research Center in Palo Alto, California. This event can be viewed on the web ([youtu.be/qiWXBjT92IA1](https://youtu.be/qiWXBjT92IA1)). The video of his remarks can be found at the end of the celebration of life video.

**Johan de Kleer** is a AAI Fellow and IJCAI Computers and Thought winner and widely published in qualitative reasoning, model-based diagnosis and truth-maintenance systems. Danny had been at PARC for 7 years before Johan arrived at PARC in 1979. Danny's and Johan's relationship evolved over 38 years. Danny was first a mentor, then a collaborator and coauthor. Danny and his wife Toni Wagner became de Kleer's good friends. Over the last decade Johan was Danny's manager. "I greatly miss him."