Danny Bobrow:
A Personal Recollection

Rusty Bobrow

■ *Danny Bobrow was a renowned computer and cognitive scientist, with many honors and firsts in his vita, but to those lucky enough to know him personally, his warmth, caring, and humor were at least as important as his undoubted creativity and intellectual ability. His brother Rusty, a long-time AI researcher himself, pays personal tribute to all these aspects of Danny's personality.*

My professional relationship with Danny was extensive, but my personal relationship was deeper and more sporadic (far too sporadic as I now wistfully realize). This has shaped my perspective, so rather than give a dry characterization of Danny as an AI luminary, I want to capture themes in his career and tie them to their roots in our family.

Danny was the oldest of four sons. Our father was a quiet man, a patent attorney who loved science and

technology, building and fixing things for people, and tinkering. Our mother, a true extrovert, loved people and the arts, and was always a fierce advocate in getting people what they needed to succeed and prosper. The entire family loved language and ideas — our father taught us the joy of punning; this became such a central part of Danny's character and sense of humor that he would often spontaneously engage in rather arcane puns and wordplay even when conversation was difficult in his last months.

Naturally, from this background, Danny loved people, loved ideas, and loved to create the tools and environments for people to solve problems. He made creative connections — he was a true collaborator and friend. I was lucky to be one of the earliest beneficiaries of the skill Terry Winograd has characterized as "Danny, the intelligence amplifier."

From my earliest childhood memories, he was warm, loving, humorous, and a fantastic listener; he successfully merged my Mother's love of people with my Father's warmth and quiet ability to listen and to teach. He also joined my Mother's fierce helpfulness and my Dad's sense of justice — as Bonnie Webber wrote me, "My memory of him is of his never shirking from speaking up if he saw an injustice."

People say that Danny was a tremendous collaborator — he was also an instigator. He certainly knew how to challenge people in ways that brought out their best efforts and creativity. Starting at BBN, he was always looking for the right tool to solve problems, his own and those of his collaborators. Building such tools was a complex task, and the key to his success was his ability to motivate, guide, and collaborate.

After receiving his PhD from the Massachusetts Institute of Technology (MIT), Danny returned to BBN to restart the AI Department. While his primary research interest was language and meaning, his creativity and problem solving abilities immediately focused on the tool-building that would be a major subthread of his activities. For the remainder of his career he simultaneously pursued leading-edge research alongside development of the tools needed to make such research successful. He found the best people, convinced them that working on these problems was exciting and fun, and was always an active collaborator even more than a manager. His personal warmth and genuine concern for people combined with his infectious enthusiasm to help him pull together a ground-breaking group of collaborators in the fields that eventually became known as "cognitive science."

Over the years, he hired students who quickly became recognized as world-class researchers like Bill Woods, Ross Quillian, Ron Kaplan, and John Makhoul, luring them, perhaps, with his unbounded optimism. Bill Woods tells of visiting Danny at home when his daughter Kimberly was 2 years old. Danny said that he expected them to jointly build computer language capabilities that would keep up with her as she grew up. While we may not yet have lived up to Danny's enthusiasm, arguably the group of people he brought together were the seeds for todays flowering of commercial natural language and speech systems.

To complement his scientific colleagues, he worked with equally world-class software engineers like Ray Tomlinson and outside collaborators to produce innovations in the deep internals of the Lisp system. He built a software team including Dan Murphy and Alice Hartley, collaborating to produce an expanding series of Lisp implementations leading to Interlisp. Meeting the challenges of developing very large (for the day) systems on computers with minuscule main memory, he led them to push the state of the art in virtual memory and operating systems, going from software to hardware paging, eventually producing TENEX.

Recognizing, from his own frustrations, that programmer productivity was a primary limiting factor in building large systems, Danny hired and then continually challenged his former roommate Warren Teitelman to produce DWIM, arguably the world's first IDE. He collaborated with Seymour Papert and Wally Feuerzeig to revolutionize the teaching of computational ideas to young children, designing and then implementing the first version of LOGO in Lisp. His friendship and enthusiasm helped bring Frank Heart to BBN, and from that seed grew the Arpanet and the Internet.

Danny's time at BBN was a precursor of his even more ambitious and successful career at PARC, but through it all he remained Danny — as Candy Sidner wrote "creative, always curious, fun, kind, energetic, eternally youthful." He was infectiously warm and genuine, ingenious and a true collaborative problem solver, the best friend one could have, and for a very lucky few, the best big brother in the world.

Rusty (Robert J.) Bobrow, trained as a mathematician and neuroscientist at MIT, has been an active researcher in artificial intelligence and neuroscience since 1967. He is fascinated by how the brain is able to integrate multiple knowledge sources to perceive the world and understand language. Over the years this has led him to design and build natural language systems that simultaneously apply semantics and syntax, and to play an active role in many knowledge representation efforts, including the first description logic systems. In recent years he has led projects in computational cognitive neuroscience, and visualization, leading to multiple patents in visualization based on the perceptual neuroscience of vision. Danny was an inspiration to Rusty from his (very) earliest days, and in later years was his favorite (but too infrequent) partner for wonderful intellectual discussions.