Neal Lane, Civic Scientist and Mentor

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June 2005

His scientific life broadened into a life of public service that caused him to put all his knowledge and skills to work for the improvement of society.

– Neal Lane, "Benjamin Franklin, Civic Scientist" (2003)

This is an excerpt from a larger manuscript entitled "Bridging the Gap Between Science and Society."

You are about to read a remarkable collection of essays. Each essay evolved from a talk its author presented during an intensive two-day conference held during November, 2003 at the James A. Baker III Institute for Public Policy on the campus of Rice University in Houston. The authors comprise a veritable Who's Who of leaders in the branches of the federal government that are responsible for the health of science and technology in America.

Several traits unite these essays. First, each essay addresses an urgent global problem. Here you will read about energy, the environment, nuclear security, the escalating scientific illiteracy of the public, and more. Second, each essay addresses issues at the turbulent interface between science and public policy. And third, each essay addresses a major concern of the remarkable man in whose honor this conference was held, Neal Lane.

The authors of these essays acknowledge, directly or indirectly, the contributions Neal made to public policy during his recent tenure in Washington: first, from October 1993 to August 1998, as Director of the National Science Foundation; then, from August 1998 to January 2001, as Assistant to the President for Science and Technology and Director of the White House Office of Science and Technology Policy.

I want to introduce you to Neal as I know him, to the Neal Lane these essays will not tell you about. Attendees at the Rice Conference got a glimpse of the "other" Neal Lane during a raucous post-dinner "roast" masterfully presented by Peet Hickman, a faculty member at Lehigh University. Like Peet, James Cohen and Lee Collins of the Los Alamos National Laboratory—the driving forces behind the conception and realization of this conference—were students of theoretical physics in Neal's graduate research group in the Rice Physics Department long before Neal left the academy for Washington. I, too, was one of the lucky few in that group.

Neal trained graduate students and postdoctoral researchers at Rice from 1966 to 1984. He had come to Rice, via a post-doctoral appointment at Queen's University, Belfast, after getting his doctorate in 1964 from the University of Oklahoma. A native of the state, Neal spent his undergraduate and graduate years at Oklahoma, where, among his many accomplishments, he wooed and won his wife and partner Joni—who did almost as much as Neal to help us students survive the rigors of graduate training. Raised by parents who loved learning, Neal seemed born with a hunger for knowledge, a passion for learning, and a knack for explaining what he knew to others. After discovering while an undergraduate that, as he puts it, his "experimental skills were wanting," Neal turned to theoretical physics and joined the research group of Prof. Chun Lin, who is now a faculty member at the University of Wisconsin. Luckily for Neal, his wife Joni also loved computing and helped with his research during his graduate, postdoctoral, and early faculty years. Armed with a solid background in physics and mathematics, a visionary commitment to education as a necessary concomitant to research, and a talented and computationally literate wife, Neal entered the academy and set up the group of students I later joined.

In those early years Neal focused, as must all newly-minted university faculty, on honing his skills as a teacher and forging his career as a scientist. In courses that ranged from the canonical and vital ``Physics for Poets" to the archetypical arcana of advanced graduate specialty classes, he rapidly earned a campus-wide reputation as a witty, caring, and demanding teacher. In his research on the theoretical physics of atoms and molecules, he earned an international reputation as a careful and insightful scientist. (On campus, Neal's reputation as a scientist included his knack for devising thesis problems that turned out to be vastly more difficult than they initially seemed.) From 1962 to 1994 Neal, his collaborators, and his students wrote 105 refereed research papers that were published in the premier journals of professional physics. These papers, which reported research on such topics as ion collisions in plasmas, the physics of liquid helium, and collisions of low-energy electrons with molecules present in planetary atmospheres, represent an important contribution to our ever-growing base of knowledge about the physical universe and to exigent technologies such as lasers and potential sources of energy based on nuclear fusion.

What was it like to work for Neal? It was really hard. I once overheard Neal reveal a bit more about himself than he may have intended. A student in his freshman course for non-physics majors asked him how she could do well on an upcoming exam. With a friendly smile and a twinkle in his eye, Neal said, "know everything and don't make any mistakes." That about sums up the experience of being Neal's graduate student.

Always kind, always encouraging, and almost supernaturally patient, Neal never talked down to his students. He never imposed rigid deadlines. Rather, he let us find our own way. He let us struggle and flounder, but in a supportive, intellectually safe environment where we could make mistakes, fix them, and thereby mature as scientists. Still, at some primal level each of us knew that substandard or sloppy work just would not do, that only our best would suffice. Rather than drive his students, Neal used his nascent political acumen—a talent he would later refine in no less formidable a forum than the United States Congress—to channel our drive, ambition, and energy to do what he (rightly) thought was best for us. So deft was he at this art that only much later, if ever, did we realize that we had been benevolently manipulated.

Directing graduate students may sound trivial compared to directing the National Science Foundation, but directing graduate students is no easy task. It requires a long-term investment of time and energy, an empathetic sensitivity to the human

psyche, and steadiness in the face of occasional eruptions of student angst. Try as we might, none of us could quite figure out how Neal did it so well. But we were not idiots; we noticed clues. Throughout his career, Neal's signature style has been calm, reasoned argument. (Only once did I hear him lose his temper, during a phone conversation with an obdurate Mazda dealer.) Rather than hector and yell, Neal uses his charm, insight into human nature, and political skills to build consensus. Rarely does Neal overtly criticize others; he genuinely respects their opinions, even if he suspects (or knows) them to be wrong. His well-honed style enabled Neal to shape a bunch of bright, ambitious, but intellectually unruly young men and women into professional scientists, just as it later facilitated his work in government.

In Washington, at the National Science Foundation, Neal created programs to encourage, support, and reward the synergistic integration of teaching and research, making this one of the Foundation's strategic goals. He led major efforts to streamline the process of peer review whereby the Foundation decides which research proposals merit funding, and to plan and fund the construction of large research facilities including telescopes, particle accelerators and detectors, a gravitational-wave observatory, and research ships and aircraft. He accelerated NSF's efforts to do business electronically, and established NSF's first child-care center for employees. He convinced the President and Congress to rebuild the aging South Pole Research Station, and fought back an effort by some members of Congress to de-emphasize the social sciences at NSF. As if that weren't enough, he also supported interdisciplinary initiatives in areas ranging from information technology to plant genomics, from Arctic research to climate change, and beyond. He was steadfast in defense of basic research during a time when industrial competitiveness and technology transfer were at the top of all political agendas.

Later, as Science Advisor to President Clinton and Director of the Office of Science and Technology Policy, Neal fought for substantial increases in funding of all fields of research—especially in the physical sciences and engineering, disciplines that had long been neglected in the federal budget process. President Clinton's FY2001 budget included an increase for NSF that was almost double the largest dollar increase the agency had ever received. Neal was a key White House advocate for what became the National Nanotechnology Initiative, which has continued to garner political support and annual funding of about $1 billion. In the White House, Neal also had responsibility for a wide range of science and technology matters involving health, energy, security, the environment and climate change, food safety and biotechnology, the human genome project, information technology, cybersecurity, partnerships with industry, international cooperation in research, the space program, and many others. In addition to sitting with cabinet members and at the President's table of advisors, Neal greatly expanded the role of Science Advisor as spokesperson for science to the public. By channeling his passion for ideas, insight into public policy, and understanding of science through his witty, self-effacing style, Neal became a media-aware communicator whose speeches and op-ed pieces, in venues from Rotary clubs to newspapers such as *USA Today*, are as persuasive as they are popular.

Through his efforts in Washington, Neal came to embody the concept of the scientist as activist citizen. Those of us who worked for Neal at Rice, long before his tenure in government, knew that his concept of a contemporary scientist was broader and deeper than ours. During many a party at the Lanes' house, his late night conversations with students, most of whom were blissfully sated with their first good meal in months, often turned to our responsibilities to the society that, we hoped, would support our research. In subsequent years, he refined his ideas into the figure of the civic scientist.

Neal recently described the civic scientist in speeches and in an article about America's first science advisor to the President, Benjamin Franklin, whom he identifies as "the founding father of civic science." Neal defines the civic scientist as "a thoughtful and mainstream contributory member of society" who "uses his or her special scientific knowledge and skills to influence policy and inform the public." For him, the qualities that made Franklin the paradigmatic civic scientist were his wisdom, his ability to communicate science to politicians and the public, his ability to transform conflict into consensus, and his willingness to accept and act upon the scientist's larger responsibilities to a world urgently in need of clear thinking and rational, fact-based analysis. Neal's description of Franklin as exemplary civic scientist is all but autobiographical.

Now Neal and Joni are back at Rice, where he is the Malcolm Gillis University Professor, a faculty member in the Department of Physics and Astronomy, and a Senior Fellow of the James A. Baker III Institute for Public Policy. The Baker Institute is an ideal home for Neal. As Institute Director Edward Djerejian puts it, "Neal Lane symbolizes what the Baker Institute is about—a bridge between the world of ideas and action." Happily, Neal is again working with students. Rather than theoretical physics, his current work focuses on policy matters related to energy, space exploration, the environment, nanotechnology, biomedical research, international cooperation among scientists, science education in K–12 schools, and, as always, communicating science to the public. When not working at Rice or jetting around the country serving on boards and giving speeches at conferences and Universities, Neal enjoys scuba diving and spending time with Joni and their children, Christy Saydjari and John Lane, and four grandchildren, Allia and Alex Saydjari and Matthew and Jessica Lane.

Throughout his long and varied career, Neal has served a remarkable range of constituencies. In Washington—at the White House and, before that, at the National Science Foundation—Neal did a great deal of good for a great many people: the American scientific community and the general public. Prior to his Washington years—as Provost at Rice and, before that, as Chancellor of the University of Colorado at Colorado Springs—Neal served a smaller constituency: faculty and staff whom he inspired to better serve their constituents, the students.

Earlier still, as a faculty member in the Rice Physics Department, Neal served a far smaller group. He directed five master's students: Amelia Day, Thomas Cook, J. Alan Haggard, James O'Connell, and Benjamin West; and twelve PhD students: myself, Kenneth Black, Lawrence Carlson, James Cohen, Lee Collins, Stephen Evans, A. Peet Hickman, Steven Preston, M. Sam Shaw, Russell Simpson, Walter Steets, and Jon Weisheit. He collaborated with eleven postdocs: Bill Archer, R. Dixon, Chizuko Dutta, Greg Hatton, Mineo Kimura, Anil Kumar, Nely Padial, Bidhan Saha, Karl Scheibner, Tom Winter, and Barbara Whitten.

Mustering his intellect, passion for knowledge, and understated but unyielding insistence that we meet the highest standards, Neal trained each of us, one at a time, molding the chaotic energies of our enthusiasms into the disciplined rigor of the theoretical physicist. Without him, we would not be who we are today, and we will be forever grateful. Years later, in Washington, Neal focused those qualities on societal questions by leading visionary programs and by representing science to both the nation's leaders and to the general public. From Rice to the White House, Neal has shown what it means to be a civic scientist. Ben Franklin would be proud.