An impromptu interview with Sidney Altman

by Evgenia Sendova

Date: Fri, May 13, 2016

I had met Prof. Sidney Altman before, at a family celebration of Prof. Friedman, and learned from the latter that they had both been undergraduates at MIT and later had continued their studies together at Columbia Graduate School.

Here is what Prof. Altman was kind to share with me on the occasion of Prof. Friedman's 80th anniversary:

Ed was three years ahead of me at MIT but what I remember from that time and now is his real intelligence and ability to think about important matters. Ed was a very good physicist and then he subsequently moved into academic administration, which he did well. My wife and I visited Ed and Arline when Ed was the American counterpart of the dean of the school of engineering at Kabul University, before the Russians invaded. He was respected for that job, too, by the Afghans. Ed and I were always interested in doing what we could to defuse the nuclear arms race although Ed has done much more than I did in this regard. He is a person with a variety of talents. We talk with him about everything, including, of course, our children.

Sidney Altman,
Sterling Professor of Biology,
Yale University,
Dean of Yale College,
Nobel Prize in Chemistry, 1989 (with Thomas R. Cech)
sidney.altman@yale.edu

Expertise

- Chemistry
- Biophysics
- Molecular biology

Education

- Ph.D., University of Colorado
- B.Sc., Massachusetts Institute of Technology

Interview with Victor B. Lawrence

by Evgenia Sendova

Date: Mon, May 9, 2016

Victor B. Lawrence,
Distinguished Research Professor,
Center for Intelligent Networked Systems,
Stevens Institute of Technology
vlawrenc@stevens.edu

Expertise

- Signal processing
- Intelligent communication networks

Education

- Ph.D. in EE, Imperial College of Science and Technology at the University of London
- M.S. in EE, Imperial Coll. of Sci. and Tech. (U. of London)
- B.Sc. in EE, Imperial Coll. of Sci. and Tech. (U. of London)

E.S. *Dear Victor, I hope I could address you by your first name as I know you as a dear friend of Ed Friedman whom I was honored to meet at one of my visits to Hoboken. I have a special request – to share some of your impressions of Ed's activities for a special issue of* Serdica Journal of Computing *which will be dedicated to his* 80^{th} *anniversary.*

V.L. It is my great pleasure and I am honored to talk about Dr. Edward Friedman on such a special occasion.

E.S. *Dr. Lawrence, as a scientist who is a Fellow of the National Academy of Inventors and who has spent 30 years at Bell Laboratories, which features of the work of Ed Friedman impressed you the most?*

V.L. Let me start with a broad view of Prof. Edward Friedman: Over the span of about 50–60 years he has contributed enormously in all fields, starting with significant contributions to Physics; he travelled to Afghanistan, where he helped found the College of Engineering, came back to Stevens Institute of Technology and became its Dean for ten consecutive years. During his tenure he was the first in the world to introduce computers to students as part of the curriculum. This was not an easy thing to do – at the time (1982) there were not enough computers to do this. However, he was able to modify the use of computers, hardware and software, to fit the environment of teaching.

There were many professors, deans, and provosts who visited him to gain understanding about the outcomes of his innovations in using technology in education. He participated in setting up schools and colleges for developing countries, emphasizing the role of computers as an integral part of the curriculum.

E.S. *How would you describe the relationship between science and education and what is the role of Prof. Friedman in this respect from your perspective?*

V.L. Ed Friedman has been at the fore-front of e-education, and one of the pioneers for STEM education. As founder and past director of the Center for Improved Engineering and Science Education (CIESE) he researched how to bring science and technology into K-12 schools for STEM. For his contributions in STEM education he received the New Jersey State Albert Einstein Medal for educational leadership. He then turned his attention to helping developing countries. This is when I got to know him. The help he provided contributed in a significant way to accelerating the development of e-health, mobile health, e-education. During the last decade, he has turned his attention back to physics – how to help get rid of nuclear weapons.

E.S. *Which is your favorite discussion topic with him?*

V.L. Our favorite topics of discussion are e-health, e-education, e-agriculture. We often discuss how new technologies can be introduced in teaching.

He is an exceptionally well balanced and creative person, who is always looking for ways to help use technology for the well-being of humanity.

E.S. *Thank you very much for your expressed readiness to take part in such an interview. I am just a modest member of the Editorial board but I am happy to have had the chance to collaborate with Ed, and to meet some of his great friends.*

Interview with
James E. McClellan III

by Evgenia Sendova

Date: Tue, June 14, 2016

James E. McClellan III,
Professor Emeritus of History of Science, College of Arts & Letters,
Stevens Institute of Technology
jmcclell@stevens.edu

Expertise

- History
- History of science
- Historiography
- Numismatics

Education

- M.Eng. (h.c.), Stevens Institute of Technology
- Ph.D., Princeton University
- M.A., Princeton University
- B.A., Columbia College, Columbia University

E.S. *Dear Prof. McClellan, thank you for your readiness to participate in an interview in honor of Prof. Ed Friedman to appear in the special issue of* Serdica Journal of Computing, *dedicated to his* 80^{th} *anniversary.*

Here are a couple of questions I kindly ask you to address when describing what you find the most important about his activities:

- *Prof. McClellan, as a humanities professor at Stevens Institute of Technology and a renowned historian of science, what type of collaboration did you have with Prof. Friedman whom we know for his passion about digital technology?*
- *How would you describe the relationship between science, history, technology and education and what is the role of Prof. Friedman in this respect from your perspective?*
- *Which is your favorite discussion topic with him?*

J.McC. It is my great pleasure and I am honored to write for the special issue of *Serdica Journal of Computing* in honor of Dr. Edward A. Friedman on the occasion of his 80^{th} birthday.

I have known Ed Friedman since 1977, when as Dean of the College at Stevens Institute of Technology, he interviewed me for a position as assistant professor in the Humanities Department at Stevens. I'm not sure he liked me because I had zero experience teaching engineers, but I suppose my training in

history of science made me enough of a fit in his eyes, and I am pleased to say that Ed and I have now had almost forty years of collegial contact and fruitful interaction. I consider him a friend of longstanding.

The fact that when I first met him Ed Friedman was Dean of the College at Stevens indicates an important element of his career at Stevens that many of your readers might not know or appreciate. He was and is one of these people who in the course of their academic careers contribute to keeping our academic institutions together and running. Ed initially held a faculty post in the Physics Department before moving into more central administration as dean. After that, he transitioned to the Department of Management and then to our School of Business at Stevens. Ed's administrative contributions across the board, like so many others who take shared governance seriously, go largely unsung, but are and were no less impactful at Stevens Institute of Technology.

Ed's intellectual reach is another of his characteristics that make him such a wonderful colleague. What was said of Charles Darwin, "A man of enlarged curiosity," might well be said of Ed Friedman. Particularly in the area of thinking about computers, information, and the Internet, Ed was a visionary, leading us all into a new world we hardly suspected. For example, as Dean, Ed was responsible for the pioneering requirement instituted in 1982 at Stevens that all entering first-year students have a PC, and he and others in the university early on pushed for the use of computers in education. This requirement was dropped in 2014, given that students today are all too well provided with their own devices, but at the time and for many years the Stevens PC program was ahead of its time, thanks again to Ed's visionary insight.

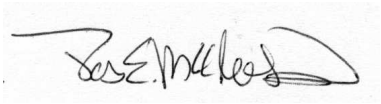
Along these lines, back in the '80s, well before the days of the Internet, I recall Ed saying that, soon, we would be able to store all of the information in the U.S. Library of Congress in a small cube that we could access. I thought I was mostly humoring Ed and another of his wild ideas when I agreed with him, but Ed saw what most of us didn't. In this kind of thinking, Ed Friedman was a prophet in the information revolution that led to the world-changing migration of information and access to information to the Internet and the World Wide Web.

Back in the late 1980s I worked directly with Ed Friedman on another of his projects as an educator and technological innovator. With a grant from the New Jersey Department of Education in 1987-1988 Ed, myself, and our Stevens colleague Dr. Arthur Shapiro designed a pedagogical experiment designed to test the effectiveness of integrating full-text databases into undergraduate course materials. The course in question was my Hu361: Galileo and the Scientific Revolution. With permissions from publishers we created a database of 4700

pages of scholarly and primary material in English concerning the work and life of Galileo Galilei (1564-1642). It says something about the context of those early days that optical character recognition (OCR) software was so unreliable that it proved more effective to send the texts to a service in the Philippines that retyped each and every page to create an accessible digital electronic resource for students at the library. A versatile search engine allowed students to approach our subject matter in a new way... asking questions and finding answers. The Galileo database was thus integrated into the course, and the result was a happy one for students, the instructor and the evaluators.[1] It's a tiny example, but a remarkable time capsule. It offers a snapshot of the state of computer technology in general and in education back in the day that contrasts so sharply with digital technologies and educational opportunities all around us and available today to students and teachers at all levels. More to the point right now, Ed Friedman was on the forefront of how we got from there to here.

Ed has moved on in his concerns to address scientific and political issues surrounding nuclear power and nuclear arms and armaments. His is a voice keeping us alert to the continuing danger of the proliferation and possible use of nuclear weapons. He is likewise a vocal proponent of safer alternatives to the current technology for nuclear power plants generating electricity. In these efforts, Ed Friedman has been, as he has always been, someone grounded in science and a passionate citizen pointing us on to our best future.

Yours sincerely,



James E. McClellan III
Professor Emeritus of History of Science

[1] See E. A. Friedman, J. E. McClellan and A. Shapiro, "Introducing Undergraduate Students to Automated Text Retrieval in Humanities Courses," *Humanities and the Computer, New Directions*, Davis S. Miall, ed., Oxford: Oxford University Press, 1990, pp. 103–112.

Interview with Charles D. Ferguson

by Solomon Passy

Date: Fri, May 13, 2016

Charles D. Ferguson, Ph.D.
President
Federation of American Scientists
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http://www.fas.org
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@cdfergusonII

Expertise

- Nuclear proliferation
- Arms control
- Nuclear energy
- Nuclear and radiological terrorism

Education

- Ph.D., Physics, Boston University
- M.A., Physics, Boston University
- B.Sc., Physics, United States Naval Academy

S.P. *Dear Dr Ferguson, I would appreciate it greatly if you find time to answer a couple of questions which would throw light on the activities of Prof. Friedman in the context of nuclear safety worldwide, and some related issues of interest to the readers of* Serdica Journal of Computing.

Which accomplishments of Prof. Ed Friedman would you define as the most significant from your perspective?

C.F. While I have only known Prof. Friedman for about four years, I have gotten to know him and his life's accomplishments reasonably well during our many email exchanges, phone calls, and in-person meetings. A few accomplishments stand out in my mind: (i) When Prof. Friedman was in his early 20s to early 30s he made significant contributions as an analyst at Herman Kahn's Hudson Institute (where Ed served the role of a scientist who questioned many underlying assumptions about nuclear weapons and war) and as an organizer of community groups that brought together scientists to educate the public about societal issues. (ii) His work in the 1970s in helping to create the School of Engineering at Kabul University in Afghanistan. (iii) His work in introducing personal computers into colleges and universities. He was on the cutting edge of that development. (iv) His work with African countries on health care issues. (v) Most recently, his work on addressing nuclear dangers and educating students and the general public about the need for more effort on preventing nuclear terrorism, for example.

S.P. *How would you describe the relationship between science and politics? What is the greatest achievement of a scientist in politics and which is the biggest achievement of politics in science?*

C.F. This is a complex and sometimes fraught relationship in that the big question (to my mind) is whether science and scientists should have a major role in public policy or what that role should be. That is, should scientists serve as decision makers or just be at the service of decision makers? I would say that scientists need to be involved in both roles while recognizing that politicians often have specialized expertise in knowing the "will" of the people they represent.

I am not sure what the greatest achievement is a scientist in politics. I have to admit that I try to stay out of politics. I will mention Prof. Tom Neff at MIT who put forward the idea in the early 1990 to take hundreds of tonnes of Russian weapons uranium and turn it into low enriched uranium to fuel nuclear reactors. Indeed, politicians actually listened to him and the plan worked via the Megatons-to-Megawatts Project, which eliminated 500 tonnes of weapons uranium. As to the biggest achievement of politics affecting science, probably the development of the atomic bomb would have to rank high on my list. I am not saying this is a positive development, but it is certainly a very big achievement and has had a big effect on science.

S.P. *Which are the top five areas in science which will transform the life of the planet, the Solar system and the humanity in the next two decades?*

C.F. We are already seeing adverse transformations from the massive burning of fossil fuels although on the other hand, use of fossil fuels has contributed to economic development. In terms of potential positive transformations, I believe that there are huge opportunities for science and scientists to contribute to the necessary transformation to cleaner energy systems in the next couple of decades.

Secondly, the exploration of the Solar System has already been very transformative. While much exploration can and should be done with unmanned space vehicles, I believe that it would be extremely transformative to land people on Mars in the next two decades. This will be a small but important step for humanity's future beyond earth.

Thirdly, on the other hand, humanity needs to commit to taking care of life on earth. We need science to have a true green revolution in agriculture that is truly sustainable and thus moves away from reliance on fossil fueled based fertilizers. But I do tend to favor smart use of GMOs. These can help transform food production as long as the proper precautions are taken.

Fourthly, science needs to further advance public health in the phase out of infectious diseases to as large extent as possible in the next two decades.

Fifthly, continued development of robotic systems to boost productivity and to aide people in need will most likely be very transformative.

S.P. *Which are the top five risks or threats in science, technology and innovations exposing the humanity to vulnerability?*

C.F. As mentioned above, the technology of using fossil fuels has exposed humanity to potentially serious vulnerability. Another concern is the overuse of antibiotics (especially to wrongly treat virus infections) has resulted in harmful bacteria becoming resistant to antibiotics. A third concern is that gene editing could be used to adversely affect the human germ-line and then have those effects propagate rapidly among populations although such capability can be very positive as well; we need to understand the ethical considerations. A fourth risk is the misuse of cyber capabilities to expose humanity to shut downs of electrical grids and other vital services. A final risk that comes to mind is the continuing danger of use of nuclear weapons either by states or non-state actors. It was the founding mission of the Federation of American Scientists to reduce this danger. It still remains a significant risk.