Notes from a Year as a Congressional Science Fellow

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Fellowships in Congress offer a unique and valuable opportunity to connect the acoustics community with federal policymakers.

By the time this issue of *Acoustics Today* is printed, the composition of the United States Congress, plus at least one other branch of the federal government, will have changed somewhat since my year as a Congressional Science Fellow. Nonetheless, one feature will likely be the same: few, if any, members of the US Senate or House of Representatives will have a professional background in acoustics. If this conjecture seems about as important as the statement that almost no players in Major League Baseball have such a background, consider that at least 19 bills introduced in the 2015-2016 term of Congress included the word "acoustic," nested in topics as divergent as coral reef protection, law enforcement equipment, drought relief, and defense spending.

Perhaps a member of Congress need not be a scientific expert to decide wisely on these matters, just as a baseball player need not calculate the resonant frequencies of a bat to distinguish the crack of a potential home run from the thud of a likely ground ball (Adair, 2001). Still, amid the clamor in the halls of Congress, a scientifically fluent advisor can be a great aid in filtering a signal from noise. In turn, for a scientist or engineer, a stint with Congress can help teach the intricate language of policymaking. This is the theory behind Congressional Science Fellowships, first organized in 1973 by the American Association for the Advancement of Science (AAAS)[1] and now sponsored by more than 30 partner societies, including the American Institute of Physics (AIP) and its member group, the Acoustical Society of America (ASA).[2] With over 1,000 fellowship alumni working in government, academia, nonprofits, and industry (over 3,000 if alumni of AAAS fellowships in the executive and judicial branches of the US government are counted) and with scores of congressional offices vying for new fellows each year, it seems fair to say the theory is sound.

I was fortunate to be the AIP-ASA Congressional Science Fellow in 2015-2016, just after completing my PhD in high-energy physics. I arrived in Washington around the time Congress was debating the Iran nuclear deal and the Pope was visiting the Capitol to discuss, among other topics, the imperative for cleaner sources of energy. Both of these prospects had intrigued me as a graduate student, and I knew a little about the relevant science. What I knew barely at all and what I hoped to explore through the fellowship was the policy landscape surrounding these and other technically complex issues. I also wanted a closer look at how and why the government funds basic research. At the same time, I hoped that my skills could provide something beneficial to people making decisions about federal energy, science, and technology policy.

[1] *See the AAAS Web site on Science and Technology Policy Fellowships at https://www.aaas.org/program/science-technology-policy-fellowships.*
[2] *See the AIP Web site on AIP-ASA Congressional Science Fellowships at https://www.aip.org/policy/fellowships/cf.*

Fortunately, Congressional Science Fellows do not have to come to Congress unprepared. Every September, the AAAS runs an excellent two-week orientation for all incoming fellows, followed by a rich schedule of training and networking events throughout the year. After our orientation, the program organizers helped each fellow connect with the staffs of senators, representatives, and legislative committees to choose a host office. I interviewed with about a dozen offices seeking a scientist to work on energy issues and found a good match with the office of Senator Dianne Feinstein of California. Among the factors that drew me to Senator Feinstein's office were her leadership on the Energy and Water Development Appropriations Subcommittee, whose funding targets include the Department of Energy, and the interesting mix of power production technologies in the state she represents.

Senator Feinstein has hosted at least 11 Congressional Science Fellows over her 25 years in the Senate, including a professor of psychology who joined me there for 2015-2016. We were both welcomed and quickly integrated into the Senator's team, attending the Senator's regular conclaves with her staff, drafting memos and other materials, and meeting with a diverse stream of constituents who traveled from California to request Senator Feinstein's support for their priorities. It was a dramatic, fast-paced, yet highly disciplined environment for absorbing policy-making lessons, and I had a lot to learn. On my first day, I turned on the closed-circuit TV at my desk to watch the Senate chamber, and I could not even tell what the senators were voting to do. The record reveals that it was a "motion to invoke cloture on the motion to concur in the House amendment to the Senate amendment to H.R.719, with further amendment," words that, it is gratifying to recognize, now mean something to me.[3]

Although I have yet to fully master parliamentary procedure, I did gain a perspective on many ongoing issues involving physical science, from coal-leasing policies to seismic resiliency planning. Other compelling projects came up in areas I never expected to confront as a physicist, a good indicator of how congressional aides must constantly pivot between a wide range of matters. One staffer in my host office, himself a former Congressional Science Fellow, deftly handled a portfolio spanning natural disasters, agriculture, and veterans affairs. Naturally, the unpredictable turns of the attention of Congress after major events and political vagaries had a big influence on what all of us did on a daily basis.

Some of my favorite projects involved sorting through publicly available federal data sets. Not long before I started in her office, Senator Feinstein had introduced legislation aimed at reducing the safety risks from consumer drones. One concern in this area is the possibility of a drone colliding with a manned aircraft. Watching the simulated ingestion of a drone by a jet engine[4] quickly convinces most people that they would not want to be passengers on that jet. The probability of such an interaction is harder to assess. To provide one data-driven viewpoint, a team of the Senator's staffers worked together to analyze a couple of thousand reports of drone sightings and close calls, a task not entirely unlike analyzing particle interactions in a detector. Our simple study indicated that many planes were encountering drones under risky circumstances. These findings, reported in a handful of national media outlets, were among the arguments that helped garner support for new drone safety standards.

Another aviation topic I encountered had acoustics at its heart. As it transitions to a satellite-based system of air traffic control, the Federal Aviation Administration is rolling out new flight patterns around airports nationwide. Thousands of people bothered by the new distribution of aircraft noise have written to their representatives in Congress, and a number of congressional offices have put forward bills and amendments to address these concerns. For those of us making recommendations about these proposals, *Acoustics Today* and *The Journal of the Acoustical Society of America* provided valuable background (one review is Fidell, 2015). Talking with stakeholders underscored how the issue of community noise impacts, like many others, extends well beyond the physical measurements and into the basic questions of fairness and the costs of regulations. A future Congressional Science Fellow would certainly find more opportunities to contribute to these discussions.

For someone coming from particle physics, one of last year's best moments was the announcement of the first direct detection of gravitational waves. Emissaries from the Laser Interferometer Gravitational-Wave Observatory (LIGO)

[3] *In this vote, senators were electing to move forward (by limiting the time allowed for debate) on a short-term spending bill the House and Senate had negotiated to keep the government funded from the end of Fiscal Year 2015 until Congress reached an agreement about funding levels for Fiscal Year 2016.*

[4] *A simulation from the Virginia Tech Crashworthiness for Aerospace Structures and Hybrids (CRASH) Lab, led by Javid Bayandor, is available at https://vimeo.com/144401420.*

and the National Science Foundation beautifully communicated to my host office and the rest of Congress how they had picked up the signature of a binary black hole merger (Abbott et al., 2016). If the energy released in gravitational radiation is compared with that of sound waves, this merger was the most powerful transient event humans have ever recorded, by more than 25 orders of magnitude![5] Several legislators expressed their excitement that a multidecade investment in basic science had yielded a new channel for listening to the universe plus significant spinoff technology. At least one House member also argued that this achievement proved the value of pursuing science "in the national interest," the subject of a bill widely perceived as trying to stifle curiosity-driven research. That language reminded me how subtle the conversation about federal funding can be and how important it is to continually nurture a two-way relationship between scientists and our representatives in government.

As I finished my time in Washington, I marveled at the fact that the Congressional Science Fellowships have not only persisted but grown in number over the past four decades. In the busy congressional office buildings, where free desks are rare, it is encouraging that members of each political party make space for technical experts. Likewise, the resources that organizations like the AIP and ASA devote to this program say something quite positive about our professions.

In sharing these reflections, I hope I have conveyed how worthwhile I found the fellowship experience. But perhaps you are feeling what a group of scientists expressed after asking me about my year with Congress. "Working there must be neat," they said, "but we would be too frustrated by all the politics, the bluster, the irrational thinking." To me, that approach sounds slightly defeatist and maybe a bit responsible for the current distance between some politicians and the science we wish they appreciated. We have many options for building closer connections, and I highly recommend the Congressional Science Fellowship as one of them.

BioSketch

Rachel Carr is a Pappalardo Fellow in Physics at the Massachusetts Institute of Technology, Cambridge, MA. Her research focus is experimental particle physics and astrophysics, particularly searches for dark matter and investigations of neutrino properties. In connection with these projects, she is interested in applications of particle physics techniques for nuclear security and renewable energy generation. She received her PhD from Columbia University, New York, NY, where she studied features of neutrinos produced in nuclear reactors.

References

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[5] *This conservative figure comes from comparing the gravitational energy radiated by the black hole merger LIGO observed on September 14, 2015, with the total energy released in the August 1883 eruption of Krakatoa. That volcanic event, a good candidate for the loudest sound in recorded history, was audible to people thousands of miles away. The black hole signal was much "quieter" when it reached Earth, about a billion light years from the source.*