The Synapse: Intercollegiate science magazine

Volume 7 | Issue 1 Article 3

2015

No, I Don't Care About Molecular Spin: A Call to Action for Better Communication

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A Call to Action for Better Communication

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What does my housemate Jeffrey Levy do in the biochemistry lab all day? Jeff is the only natural sciences major in our four person house – the rest of us are musicians and computer scientists. All I know is that his work involves synthesizing chemicals and something to do with Alzheimer's…or is it Parkinson's? This obliviousness is a systemic problem throughout the Oberlin community. Neither the sciences nor their audience currently make a sufficient effort to understand one another.

I often hear well-meaning scientists ask, "How do we get more people interested in the sciences?" But this question is redundant; natural science is inherently interesting– in the outside world, in the human body, in the laws and mechanics of the universe. Science enables us to express and explore this interest, as the scientific method, for better or worse, is our most rigorous approach to gathering knowledge about our universe. It may seem myopic and slow-moving to the outside world, but it builds our understanding of the mechanics of life on every timescale imaginable. We do not need elaborate programs to foster curiosity about the questions science addresses, as the field touches on almost all subjects of natural curiosity. Instead, part of a scientist's job should be to demonstrate how science, as a particularly effective method of investigation, allows them to satisfy and further explore their curiosity about the world. The same spirit of inquiry that brings humanities students to critical theory and literature brings scientists to the lab, huddled over testing equipment.

wThere is no shortage of curiosity, but a shortage of translators. Scientists must retrieve the deeply human fascination with the world, too often buried in scientific language, and bring it back to the public sphere. These translators must be both intelligent and articulate, and liberal arts institutions with commitment to the sciences are well-situated to provide this education. This is a call to practice science in public, with curiosity on full display.

Post-college, you might find yourself at a bar, where some fine individual asks, "so what do you do, again?" As much as you might like to reach for a napkin and start drawing molecules in an ill-fated attempt to explain gas chromatography, a succinct easy-to-understand description will serve you much better. The "non-scientist" public not only includes your acquaintances and peers, but important decision-makers and public officials. Only 10 percent of the last Congress was made up of people with STEM backgrounds. One out of fourteen members in the Senate Committee on Commerce Science and Transportation represented a STEM field. The House Committee on Space Science and Technology was just over 40 percent STEM specialists. And yet, the congressionally-funded National Science Foundation provides "24 percent of all federally supported basic research conducted by America's colleges and universities." The congressionally-funded National Institute of Health "invests nearly $30.1 billion annually in medical research for the American people." With the amount of money appropriated for scientific research by non-STEM experts, it should be clear that scientists must present their work to the so-called 'court of public opinion.' Of course, NIH and NSF portion out their allocation through rigorous application processes, lead by experts in the field. However, the specter of Congress cutting funding is ever-present. If you cannot translate your research into language for a lay audience, your prospects at the bar and on the congressional floor might very well dry up!

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If it is so vital, why is this translation of scientific research often neglected? Scientific research builds on years of previous studies and shared knowledge within the field. Translation always involves loss, and the desire to explain the minutiae of scientific work runs counter to this fact. However, one must prepare for the inevitability of translation. Scientists will have to learn to live with slight inaccuracy in service of more understandable explanations, suspending for a moment their belief that years of research and education are necessary to understand what they do. Using metaphors and familiar concepts in your explanations will help clarify the importance of the research. Explaining every detail of the sampling method or computer software involved in your research is not particularly informative to a lay audience. If someone explains the framework of their research well, it will spark the natural curiosity in the listener to ask about the details that were left out. If you can sell your research in the larger context of wonder and amazement at the mechanics of our universe, the rest becomes much easier.

What is the responsibility of science educators to prepare students for the real-world in this sense? I believe there is a tremendous onus on natural science professors at Oberlin to teach their students how to navigate the professional and non-professional world. Take Professor Rebecca Whelan in Biochemistry, for example. For the last year, she has led Socializing with Scientists on Friday afternoons. "Socializing" is a weekly (pizza-fueled) meeting of curious minds in the sciences and humanities in the Science Center's Love Lounge. Students come ready to discuss research and current science news in a non-technical manner. There are even buzzers that you can ring if someone is using jargon! This event moves scientific discussion in the right direction. As Professor Whelan puts it, "I am committed to the sharing and dissemination of knowledge, not simply knowledge construction. I encourage people to view their education they get here as a tremendous gift, not to hold onto it selfishly but to think about how it can be shared." Socializing with Scientists is surely one of the many ways Oberlin can prepare science students to communicate with us lay people.

However, there should be a call for more science classes to directly relate daily life and scientific learning. Geology professor Karla Hubbard, who teaches the class Earth's Environments, says, "Most students in a 100-level course like Geo 120 are not going to end up taking multiple geology courses...I tend to think of them as the 'lay' audience. I hope that what I teach them equips them to catch when science is being presented well or poorly by the media or in conversations with others after graduation. I am not convinced that a single course in a science discipline will be enough to prepare students to translate the outcome of pure research coming out of labs and published in journal articles. I would hope that a science major could do that."

Think about the climate into which you are about to enter. NIH and NSF both suffer from wildly fluctuating budget allocations due to congressional bickering. Climate change denialism is healthy and abundant outside the confines of Oberlin. Even major news coverage of scientific breakthroughs often misrepresent or refute scientific research. It would be shortsighted to claim this as only a problem of translation. Obviously, there are many political and ideological hurdles to jump in order to remedy these problems. However, scientific translators are needed for the public! Maybe if lay audiences trusted climate science, having access to it in a form that didn't involve equations and jargon, such denialist politicians would not be elected.

Now, if anyone has access to the eyes and the ears of the public, it is the media! If the media deems your research newsworthy, you may be called for comment; if you can't explain your research well, the media will do it for you. If you cannot bear the lack of precision required for a non-technical description of the work or lack the skills to create one, the media will do the translating for you, inevitably representing your work more inaccurately than you would. Again, this is why I advocate for technical and non-technical language to be taught in science classes at Oberlin. I believe classes should sponsor spin-offs of Socializing with Scientists, requiring students to explain their work to non-experts. Even better, science majors should produce presentations to the public, involving Oberlin city residents. Efforts such as STEM nights for local schools are another great start. I encourage science majors to participate in these types events, both for the benefit of local children just discovering science, and for yourself as translation practice. No group is more curious, yet less interested in the technical nitty-gritty, than children.

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Recently, I sat down with Jeff Levy and asked him to explain his work one last time. It began as a struggle. I saw carboxyl groups and he started talking about "molecular spin" and my eyes glazed over. I reached nervously for the bowl of Dum-Dums on our living room table, crunching one between my molars. I reached out for anything that I could make sense of. He mentioned eumelanin. "Eumelanin… that sounds familiar, it's a skin pigment right?" Jeff nodded, and started to describe how these molecules link up to form "sticky" networks, potentially useful in cheap water filtration. The conversation was not easy. We stopped several times to get rid of the last bit of jargon but I understand his work now. As students, I think both sides of the "scientific divide" should try to have this kind of conversation more. These conversations not only bring us together cross-disciplinarily as scholars, but contribute to a larger discourse that affects the future of scientific research and public policy.