# WHERE'S THE EGGNOG?
## (AND OTHER DIFFICULT QUESTIONS ABOUT SCIENCE)


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Pursuing a PhD in the sciences is a strange time in one's life, especially if you've been in graduate school for a while. Your schedule is hectic, you're traveling more frequently to conferences, and you've maybe even started writing a manuscript or two. Yet with the passing of this holiday season, I am reminded of another reason for the oddness of grad school: figuring out how to explain your research to those outside of science. Very rarely does this happen with other professions. No one has to explain what a teacher or doctor does. But think about the questions you get from friends and family when you first tell them you're off to grad school: "You're going to college again?" "What do you mean you get *paid* to go to school?" "Five more years, are you crazy?!?"

The questions get different as you go on, and answering them gets more challenging. "When are you going to finally graduate?" "You're still in school but you don't take classes?" "So what exactly are you researching?"

The most difficult to answer, at least for me, has always been the last one. During my first couple of years, I thought there were only two ways to answer this question. One approach was jumping right into the subject matter, which subsequently bored the other person in the first few seconds and killed the momentum of the conversation. The usual glassy-eyed response from suddenly drowsy family members to my ramblings was "That's nice; say, where's the eggnog?" Other times I was self-conscious about sounding pretentious or overeducated, so I just simply uttered a quick one-liner like "I study science/geology/chemistry/etc." After that, it was usually *me* who dashed off to the eggnog, ashamed and embarrassed that I wasn't able to take pride in what essentially took up the majority of my life at the time.

It is obvious to me now that neither of these tactics is helpful, but it took me some time to reach that conclusion. Just like one's growth as a scientist, there is a learning curve in explaining your research to non-scientists. Over time I began to realize that these answers did not help the questioner learn more about me or my research. Granted, nobody wants to hear about the difficulties of your sample preparation or how you are reanalyzing your results by accounting for crystal-field effects. But the opposite is also true: an impersonal, generic answer can be unsatisfying and even insulting to them. Therefore, there is a fine line between making something easy to understand and overdoing it.

The theme of breaking down a topic into terms that are easy to digest for a wide audience is not foreign to this magazine. In *Elements*, our community disseminates its collective knowledge, and even though the average reader may not know much about zircon or toxic metals, they most likely have enough scientific background to learn a bit from the great reviews presented in each issue. But consider this: how would the authors of the October 2007 issue, for example, write about the critical zone if they knew their grandmother was going to read it? What if policy makers needed to make decisions based on the content? Could undergraduate students learn from it? Understanding your audience is perhaps the most important part of any type of scientific writing, and discussing science with unfamiliar friends and family is no different.

With that said, how does one prepare to explain their research in a casual, coherent manner? What you should aim for is simplicity without belittlement. Think of a good conceptual example of why your research is important. The less applied your research, the more work you may have to do. In fact, this is not a trivial point; most non-scientists do not have a complete understanding of how academic research works, and it could be useful to briefly expound upon it.

For instance, it might be useful as a scientist to explain how engineers research how to design better systems, but their knowledge base usually comes from scientists who study related problems on a more fundamental level. Although basic science is further removed from ultimately being applied to a useful technology, it is the foundation that allows us to develop a deeper understanding of the world in which we live and the laws that govern it. Learning about the history of the planet, from mountain-building events to the origin of life, has very few obvious applications towards developing new technology. And yet, understanding these types of problems is often the most rewarding for scientists, and humanity overall. It helps us define who we are, and satiates our species' hunger for knowledge. The point is not to wax philosophical on the purpose of science, but to frame your field of research in a broader context.

People tend to think of the Earth sciences as earthquakes and volcanoes (and in the case of this issue of *Elements*, one of these happens to apply!), but that's not always the case. Several topics in our field go in and out of public interest/controversy. Most everyone you speak with will understand when you mention global warming, evolution, nuclear waste, mining, oil production, etc. From there, you can start simply, beginning with things that they may know a little about, whatever that may be (rocks, minerals, petroleum, etc). You should be able to increase the scientific literacy of whomever you are talking with while at the same time connecting on a personal level.

In summary, you need to stay mindful of the following points when explaining your research to non-scientists: know your audience, keep it simple, find a common ground, and frame your research in an appropriate context. With those tips in mind, answering the question "What do you research?" won't be so difficult anymore. You can actually look forward to it! Wouldn't it be great if the next holiday season, you see the same family member, a year after your discussion of your research on, for example, high-temperature mineralogy, and she remarks how she read an article in the newspaper about energy that she would have skipped over before? After that, think of all the cool stuff you can talk about next time the eggnog is served—and you can have some together.

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