

# EARLY CAREER

The Early Career Section is a new community project, featured here in the *Notices*. This column will provide information and suggestions for graduate students, job seekers, junior academics of all types, and those who mentor them. Angela Gibney serves as the editor of this section. This month's theme is Writing. Next month's theme will be the Non-Academic Job Market.

## Outward-Facing Mathematics: A Pitch

Jordan Ellenberg



We mathematicians complain a lot about the way our profession is portrayed to the general public. Come on, you've done it! And it's not like there's nothing to complain about. Topologists are always turning coffee cups into either doughnuts or bagels, number theorists spend their days gazing at prime numbers with the ultimate aim of divining a "pattern" that will let them compromise internet commerce, etc.. Math is presented as an activity that's inherently obscure, and unpleasant for all but a preselected caste of people, usually white, male, and bearded.

Why don't journalists talk about math as it really is? Because they don't know how it really is. We do. And if we want the public discourse about math to be richer, broader, and deeper, we need to tell our own stories. We have to be mathematicians where people can see us. We have to do some outward-facing mathematics.

Those are slogans. How do you actually do it?

There are a lot of ways people can math in public. You can organize outreach programs in the city where you live, you can podcast like Evelyn Lamb and Kevin Knudson, you can pitch ideas to *Quanta*, you can be a YouTube celebrity like the folks from *Numberphile*, you can run a math booth at Lollapalooza (nobody has done this last one yet but *it's actually a good idea.*)

But there's really only one form of outward-facing math I personally know well: writing about math for general-audience publications, which I've been doing for more than twenty years now. And I meet a lot of graduate students and early-career mathematicians who are interested in doing it too. So let me tell you some of the lessons I've learned.

**There's no official way to start, so you can just start.** There aren't degrees in math writing, and there are very few in science writing. I started by writing book reviews in a local free paper, then moved on in 2001 to writing for the online magazine *Slate* in its early days. Free local papers are

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DOI: <https://dx.doi.org/10.1090/noti1813>

gone and the notion of being “published” is a lot fuzzier than it used to be. So how do you write something and get people to see it? Social media drives attention, but no one has yet figured out a great way to tweet or Snap about math. That’s why blogging is still alive for mathematicians, even as blogs have withered somewhat on the whole. I think best practice for getting started is to blog on a platform like Medium or WordPress, then use social media to bring readers to your writing. When you want to pitch a piece to a more formal publication, they’ll want to see what your writing looks like: with the blog, you’ll have something to show them. Don’t let that stress you out, though! A wise veteran blogger once told me: the secret to blogging is to have pretty low standards. If you don’t write until you feel extremely inspired, and don’t hit publish until you’re certain every word is perfect, you won’t write many posts. Write enough posts and you’re sure to have three really great ones for calling cards.

**Editors are hungry for math content.** Editors like an angle. If there’s a math angle to a story in the news, pitch it! As someone with a degree in math, you have something to offer that most writers don’t. Editors *love* having something other publications don’t. Especially salable are pitches of the form “Everybody is saying X but because of math it’s actually not-X.”

**Readers are more interested in pure math than you think.** Not every math story has to be a mathematically inflected hot take on the headline of the week. I wrote a piece for *Slate* about Yitang Zhang’s proof of bounded gaps between primes. I thought they were just being nice to a long-time writer by giving me some space to write about number theory. That piece turned out to be the most-read and most-shared thing I ever wrote for them. Those of us who teach spend a lot of hours talking about math in front of students who have been forced to be there. That makes it easy to forget that people out in the world generally admire math and are excited to learn about it, if we give them a way in! (I’d argue this is largely true of our students as well, but that’s another article.)

**But they’re not as interested in pure math as we are.** So when you write a 1000-word magazine piece about a development in pure mathematics, you’re not going to give the same kind of full picture you would in a colloquium talk. You shouldn’t even try. The result is the same as when you give an hour-long seminar talk in a 20-minute slot; you do everything too fast and the talk ends up conveying nothing at all. Your approach should be to transmit *one thing* about the research advance. In the case of Zhang’s proof, all I explained was why number theorists *expected* bounded gaps to be true (because it’s what you’d find if primes were randomly strewn). The one thing could be an idea in the proof, it could be something in the history of the problem, it could be something in the biography of the researcher, as long as it’s something you can really cover in a small space. Of course there are a lot of important developments in

math that really don’t have *any* crisp, self-contained ideas to express. Those are probably not the right developments to write about in a short broad-circulation article.

**Writing is teaching is (partly) marketing.** Still feeling bad about having to oversimplify or (a phrase I mention only to object to it) “dumb down” the subject in order to talk to the public? I think of it like this. Writing is an extension of our teaching mission. Three hours a week of lecture isn’t enough time to fully explain the material of a course, not even close. Our role is to convince the students that it’s worth *their* time, spent on their own, to learn the math more fully. And the best way to do this is to let our own hot feelings for the math spill out into the way we talk and comport ourselves. Writing for the public is the same, with even more stringent time restrictions. To use crass commercial language, we are marketing. Building the brand! Your 1000 words are like a movie trailer. The trailer isn’t the whole movie shown super-fast; it’s a means of convincing people the movie is worth tracking down and watching in full. Most readers won’t, and that’s OK; they’ll still have some loose sense of what the movie’s about, and that’s a lot better than nothing.

**Writing can be occasional.** For quite a while, including pre-tenure, I wrote 2-4 magazine articles a year. This is something you can definitely do without compromising your research. It just doesn’t take that much time, and the more you do it, the faster you get. Writing about math doesn’t typically require you to fly across the country and do interviews; you’re mostly writing about things you already know and you can write in the time between other tasks. (Writing a book is a different story and I wouldn’t recommend it to a junior mathematician still launching a research program.)

**The chair/department/hiring committee will be OK with it.** At first, I worried whether my department would mind that I was spending some of my time writing for the public, or whether the mathematical community at large would take me less seriously. Neither has happened. My experience is that public outreach is something most mathematicians simultaneously think should be done and don’t want to do themselves. If you’re one of those who’s moved to do it, colleagues are grateful, not dismissive! And there’s at least one direct professional reward: writing for the public is ace material for the “Broader Impact” section of an NSF grant proposal.

**Good math writing is good writing.** This is the most important part. Writing about math never succeeds unless it succeeds as writing. The same rules that apply to grumpy editorials, celebrity profiles, and sports analysis apply to us too. The words should be the right words and they should be in their right places. I once thought I might want to be a novelist, and I spent a year in creative writing grad school before getting my PhD in math. That’s certainly more training than is necessary! But the lessons I learned there have served me every since. Math writing is interdisciplinary by

nature; you have to care about the math *and* the words. Whatever virtues sing to you in the writers you love (not just the math writers, all the writers) are the ones you should try to imitate. If you write a sentence you love, there will be readers who love it too. And some of them, drawn in, will learn more mathematics than they knew they wanted to.



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