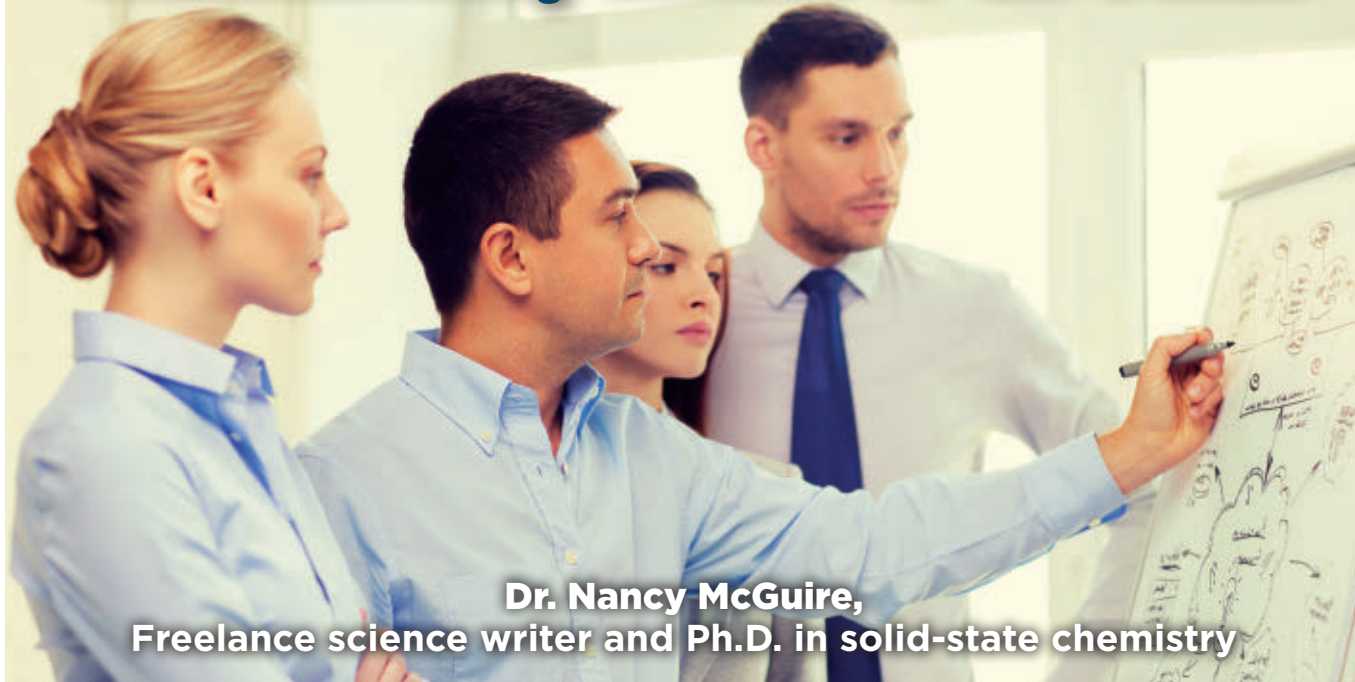


Would You Buy a Retro-Encabulator?

Communicating Science to the Public



Dr. Nancy McGuire,
Freelance science writer and Ph.D. in solid-state chemistry

Have you ever told your friends about a really exciting development in your research, only to see their eyes glaze over? If you can't excite your friends about your research, how will you convince a manager or a funding agency?

In a previous job, I co-taught lunchtime seminars on writing about technical topics for nontechnical readers. We always started with a video clip of a man explaining a device called a Retro-Encabulator. (<https://www.youtube.com/watch?v=aW2LvQUcwqc>). Here's a sample of the script:

The line-up consisted simply of six hydrocoptic marzul vanes so fitted to the ambaphascent lunar wain shaft that side fumbling was effectively prevented. The main winding was of the normal lotus-odeltoid type placed in panendurmic semi-bulloid slots of the stator, every seventh conductor being connected by a non-reversible tremmy pipe to the differential girdle spring on the up-end of the grammeters.

Afterward, my colleague and I asked the class to discuss the video. Our

co-workers would fidget and glance around the room to see who would volunteer the first comment. When we asked how many of them had caught on that this was a comedy routine, their laughter was equal parts hilarity and relief. The babble in the video was so close to the language they encountered on the job that they hadn't seen the humor.

No matter what career path you choose, you're going to be writing about your work for a variety of readers, and you don't want to sound like the guy in the video. If you go into academia, you'll write grant proposals to fund your research. You'll teach students who are bright and willing to learn, but not familiar with your area of expertise. In industry, you'll collaborate on proposals and white papers to attract new business, establish yourself as an expert in your field, or convince your company's executives to fund your project.

You may be called on to talk with news reporters, testify as an expert witness, or give a presentation to your city council. You might write an op-ed piece

or start a blog to share what you know about a hot issue.

Fortunately, it's not hard to learn to tailor your writing to specific audiences.

Cut to the Chase

When you publish in a science journal, your readers are already interested in the topic, and they know the basic concepts. They want to know how your research builds on previous work, and they want specific details about your methods and results.

Outside your field, you must persuade readers that it's worth their time to read your writing. If you don't grab them in the first few sentences, they turn the page and move on. Who are these readers and what do they care about? (Please see sidebar, "Starting Points") Managers and clients want to know what problem you are solving, why your solution is better than the way they do things now, how soon your solution will be ready, and how much it's going to cost. They want to know if it complies with laws and regulations and whether a competing company is

Starting Points

Begin your article with your reader in mind.

Cell Reports

Microbes produce many secondary metabolites, several of which have strong aromas and are central contributors to the flavor of fermented foods and beverages such as cheese, wine, chocolate, and beer. (Styger et al., 2011; Swiegers et al., 2005).

Christiaens, J.F.; Franco, L.M.; et al. "The Fungal Aroma Gene ATF1 Promotes Dispersal of Yeast Cells through Insect Vectors." *Cell Reports* [Online] **2014**, 9, 425–432. <http://dx.doi.org/10.1016/j.celrep.2014.09.009> (open access) (accessed Jan 14, 2015)

This video uses visual elements and humor to summarize the same topic in 2.5 minutes.

<http://www.acs.org/content/acs/en/pressroom/newsreleases/2014/november/why-fruit-flies-could-lead-to-better-beer-video1.html> (accessed Jan 14, 2015)

Wired

The characteristic smell of beer is very easy to recognize, and never fails to attract beer lovers. But now scientists have found that it's really meant to attract something else entirely: fruit flies.

Sneed, Annie. Your Beer Attracts Fruit Flies on Purpose. *Wired* [Online] October 9, 2014. <http://www.wired.com/2014/10/beer-yeast-attracts-fruit-flies> (accessed Jan 14, 2015)

doing something similar.

General readers want to know how your findings affect the things that matter to them. Skip the fine details of how you set up your experiments and validated your conclusions—a brief summary and a reference to a more detailed report is sufficient. This is often a hard lesson for scientists to learn because they have invested so much work in their methodology and data collection. Nevertheless, nontechnical readers

are most interested in results, and you're writing your article for them.

Easy Reading

Your fellow scientists will pore over your journal manuscripts if your topic is important to their own research. Your nontechnical readers, not so much. They want to be drawn in and engaged, without feeling as though the article has been "dumbed down." (Please see sidebar, "Simple, Not

Dumb") Short paragraphs are a good place to start. Your readers may be sitting in a busy airport lounge, taking a short break between meetings, or reading while they watch TV. One-topic paragraphs that flow from one idea to the next help these readers follow without getting lost.

While we're at it, shorten your sentences. You can vary the length of your sentences to keep your paper from sounding like it came from a machine gun, but if your sentences are a tangle of subordinate clauses, through which readers must find their way, like sailors on an endless sea of prose, stranded for what seems like an eternity without a compass or stars to guide them ... well, you get the point.

What about short words? Read a few science articles in a nonscience publication. The articles probably used technical terms, with explanations, only when more common terms would have been inaccurate or cumbersome.

Metaphors can put unfamiliar concepts into familiar terms. An electron can "surf" on a radio wave, and microbes may "strategize" to spread their cells. Choose carefully, however. One physicist who compared transferring quantum states between atoms to a Star Trek transporter later had to deal with reporters' questions about his teleportation device.

Tell Me a Story

In science journals, the authors are often "invisible." Reagents are refluxed and reaction products are isolated. No one seems to be doing this work; it just happens. Scientists want to know about processes and products, not the people involved.

Nontechnical readers want stories, and stories have characters as well as plots. Who did what, and why? What difficulties did you encounter, and how did you react? (Please see sidebar, "Science as Storytelling") A good story doesn't always begin at the beginning and plow straight through to the end. You can begin at a pivotal point: when you made a key discovery, or when things finally fell into place. Once your audience is interested, you can go back and relate the events that led up to this point.

Simple, Not Dumb

Cell Reports

To evaluate whether changes in the yeast's aroma profile caused by the deletion of the ATF1 gene lead D. melanogaster to prefer one strain over the other, we used an olfactory behavioral assay in a specially constructed arena. In this computer-controlled system, different air-streams can be released independently from each other out of the four corners of the isolated arena and cleared through a vacuum, applied in the center of the arena.

Wired

Verstrepen and his team at University of Leuven and the Flanders Institute for Biotechnology in Belgium looked closer at how fruit flies react to the mutant beer yeast. They sent the flies into a cage and blew in air collected from different *S. cerevisiae* cultures.

Putting It Into Practice

Don't expect one brilliant flash of inspiration, leading to a single, perfect draft. My first draft of this article was more

than twice as long as my editor had requested. It was a collection of unfinished ideas, off-topic paragraphs, and bloated sentences. It was a data dump.

However, I knew what concepts I wanted to convey. In revisions, anything that didn't directly advance these concepts got cut. (I'm saving the really good stuff for other articles.) I tightened up my sentences—Why use three words when one will do?—and used examples to illustrate my points.

I learned to do this by emulating techniques from well-written articles and participating in workshops and online discussions on writing. Sometimes, I ask my friends to read my writing. Did they understand it? Was it interesting? Did they have to read something twice or look up a definition?

With a little practice, you can write a proposal for retro-encabulators that will get your manager as excited about them as you are. ■

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writer based in Silver Spring, MD. She has a Ph.D. in solid-state chemistry and began her career doing applied research.

Science as Storytelling

Cell Reports

Moreover, the most commonly used *S. cerevisiae* laboratory strains show significantly lower production of aroma compounds compared to their wild and industrial relatives (Verstrepen et al., 2003b), suggesting that the synthesis of these compounds has not been selected for under laboratory culture conditions and might rather be related to survival in complex natural environments.

...In a first preliminary assay, we observed that many different yeasts can be isolated from the body of *Drosophila* isolated from natural environments and that the vast majority of these yeasts produced aroma-active esters (Table S2).

Wired

While studying this years ago, bioengineer Kevin Verstrepen noticed that fruit flies in his lab swarmed around over-activated, flavorful yeast, and ignored non-fruity mutant yeast.

"I kind of knew already what the story would be then," Verstrepen said.

..."You could catch a few flies in your vineyard, put it in your grape juice, and make a very unique wine," said Verstrepen. He says he's also considered using fruit flies, rather than machines, to select better yeast strains for brewers.

"But to be honest," he said, "those are ideas I get after I've had a pint of beer on a Friday night."

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