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BLOGS
From The Staff

12 Tips for Scientists Writing for the General Public

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Learning the principles of journalistic nonfiction often requires scientist authors to step away from an academic writing style that has come to feel intuitive. Nevertheless, using these principles can make the scientist's work more relatable, memorable, and trusted.

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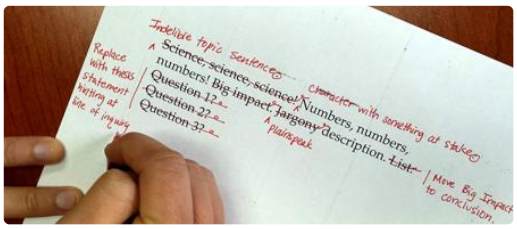

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It's no secret that **science** (http://blogs.nature.com/soapboxscience/2012/05/30/reaching-out-science-has-a-pr-problem) **has** (http://www.wired.com/2010/05/st_essay_sciencepr/) **a** (http://www.wired.com/2010/05/st_essay_sciencepr/) **PR** (http://www.jaydelovell.com/science-has-a-pr-problem/) **problem** (http://www.jaydelovell.com/science-has-a-pr-problem/). Scientists, it seems, are generally viewed as **cold and competent** (http://www.pnas.org/content/111/Supplement_4/13593.full) but not warm and trustworthy. **According to** (https://en.wikipedia.org/wiki/Stereotype_content_model) (https://en.wikipedia.org/wiki/Stereotype_content_model) social psychologist Susan Fiske of Princeton University, a person's perceived warmth strongly influences how much they are trusted. This presents a problem for scientists, especially in an era when funding, research impact, and science literacy rely so heavily on communicating effectively with a broader audience. Even when seeming warm and trustworthy could help their message be heard, it can be hard for scientists to shake the "cold and competent" stereotype. The authoritative and unemotional way that scientists are taught to write for journal articles is not usually appropriate when communicating with a general audience. Learning the principles of journalistic nonfiction often requires scientist authors to step away from an academic writing style that has come to feel intuitive. Nevertheless, using these styles can make the scientist's work more relatable, memorable, and trusted.

As an editor at *American Scientist*, the bulk of my job is helping scientists find their story and craft it compellingly in feature articles or columns. Often there are recurring themes in the suggestions we make to authors, and we are happy to provide that guidance. But for those who don't have an editor to work with, these suggestions may be useful. Since I too was trained as a scientist before entering journalism, these are all principles I follow when revising my own writing, which tends toward some of the standard academic writing habits.

Here are my 12 editorial tips for scientists:

1. Your first sentence must be indelible.

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Leave your impression early. Many academics start with something more like a broader impacts statement or an obvious foundational concept in their field, as they would in a journal article. But if you tell readers something they already know in the first sentence, they are likely to think you have nothing to say that they don't already know. You risk losing readers right then and there. If your article contains news of major breakthroughs, many of your readers will completely miss it.

Here are some great first sentences from articles in our archives:

- "The year is 2024, and I have just brought home my first quantum computer." (Brian Hayes, "**Programming Your Quantum Computer** (/node/3466)," January–February 2014)
- "In 1889, French physician Charles Édouard Brown-Séquard injected himself with an experimental mixture of testicular blood, semen, and extract from dog and guinea pig testes." (Erik Wibowo and Richard Wassursug, "**Estrogen in Men** (/node/3597)," November–December 2014 [*paywalled, available to members and subscribers*])
- "To put all human knowledge at everyone's fingertips—that was the grandiose vision of Paul Otlet, a Belgian librarian and entrepreneur." (Brian Hayes, "**Crawling Toward a Wiser Web** (/node/3673)," May–June 2015)
- "Charles Darwin's voyage aboard the Beagle is legendary in the history of science, and yet one of his notable observations is barely known." (Thomas Hart, "**Phytoliths: The Storytelling Stones Inside Plants** (/node/3636)," March–April 2015 [*paywalled, available to members and subscribers*])

2. Know where you are taking the reader first and then tell them.

I don't mean literally tell them, as in: "First, I will talk about X and then we find out why Z is related." (Zzzzzzz.) I mean *show* them—within the first page, provide them with a story that illustrates what is at stake and sets the scaffolding for your thesis. Your reader is busy and has lots of other things to read. They will not read your article unless you immediately let them know why they should, and fine prose is one of the quickest ways to focus your reader's attention.

Here are some examples of stellar *American Scientist* introductions. Note that each gets to the point quickly and has a clear thesis statement within the introduction:

- Nissa Mollema and Harry Orr, "**One Family's Search to Explain a Fatal Neurological Disorder** (/node/3439)," November–December 2013
- Gautum Dantas and Morten O. A. Sommer, "**How to Fight Back Against Antibiotic Resistance** (/node/3467)," January–February 2014 [*paywalled, available to members and subscribers*]
- Paul Bartell and Ashli Moore, "**Avian Migration: The Ultimate Red-Eye Flight (/node/3300)**," January–February 2013

3. Each subsection and paragraph is a potential pathway into the text for a scanning reader.

That means the first sentence of each paragraph and each subsection must follow the principles laid out in item 1. Each paragraph should introduce an interesting new idea with a topic sentence.

Also, unlike in academic writing, paragraphs are shorter, to help readers hop on board with each new idea. *National Geographic* is a great resource for examples of this technique—see, for instance, David Quammen's **most recent article** (http://ngm.nationalgeographic.com/2015/07/ebola/quammen-text) on Ebola. If you compare paragraph lengths within a typical *National Geographic* feature article to those found in a typical academic paper, you'll see what I mean.

As another example, here is **one report** (/node/3677) I wrote where I focused on dividing up paragraphs to make them more digestible.

4. Questions generally make poor topic sentences.

Granted, framing the topic as a question can be a hard habit to break. The scientific method is built on asking testable questions, and scientists are often trained to begin presentations and journal articles with their questions. But in narrative nonfiction, posing questions instead of stating the topic outright risks

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leaving out crucial information, such as who is asking the question, why that individual cares about it, and how it was first raised. Introducing how the line of inquiry arose in the first place is usually an important part of a science story.

5. In the same vein, each subsection needs to transition the reader from one idea to the next.

As a section concludes it should signal why the next section follows. During the editing process, one step I take after reading through the manuscript a couple of times is to read over the transitions between subsections, skipping the text in between, to see whether the transitions feel intuitive. A first draft rarely has good transitions to start with, so this read-through and revamping is an important part of the polishing process.

Here are some articles where the authors really nailed their transitions:

- Alexander J. Werth and William Shear, "**The Evolutionary Truth About Living Fossils** (/node/3596)," November–December 2014 [*paywalled, available to members and subscribers*]
- David Finkleman, "**The Dilemma of Space Debris** (/node/3460)," January–February 2014 [*paywalled, available to members and subscribers*]

6. Stop listing things—just stop!

(Except in tips lists, of course.) Try instead to figure out the narrative tying the pieces of a list together. Used profusely in academic and government writing, lists are an efficient way of communicating points or variables. But they're dry and can be a real slog for a reader. All too easily they become the place where readers' eyes will glaze over and they will start flipping to another part of the magazine or return to scanning social media. A more intuitive way to communicate such ideas is to talk about how the objects of the list are connected to one another. It might take an extra sentence or two, but the reader will grasp the concepts more readily and remember them better. If a list includes more than three items, consider that a red flag for further scrutiny. If a sentence has lists and follows another sentence with lists, it's likely that the paragraph containing them needs to be revised.

7. Use the first person.

When describing his or her research, often a scientist is the most important character in the story. Still, I find many scientists I work with fear sounding immodest if they say something to the effect of, "I made this discovery." Even though the desire to avoid the first person often comes from a sense of humility, text that is essentially autobiographical but avoids first person doesn't necessarily sound humble. It just sounds impersonal. Readers will stop reading pretty quickly if they don't feel connected with the people or places in the story. When done well, first person does not sound arrogant or immature; rather, it lets readers in on the personal side of research—what scientists find compelling, what drives them, what obstacles they had to overcome, the excitement they felt at the time of discovery. It also helps scientists establish credibility with the reader by being open about their relationship to the work.

Here are some great first-person accounts by scientists:

- David Van Tassel and Lee DeHaan, "**Wild Plants to the Rescue** (/3379)," May–June 2013
- Terrie Moffitt, Richie Poulton, and Avshalom Caspi, "**Lifelong Impact of Early Self-Control** (/node/3405)," September–October 2013 [*paywalled, available to members and subscribers*]
- D. Andrew Howell, "**Illuminating Dark Energy with Supernovae** (/node/3385)," July–August 2013 [*paywalled, available to members and subscribers*]

8. If you want people to understand that a problem addressed by your research affects real people, you need to illustrate the problem by telling a story about real people.

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Scientists often want to connect with the public by talking about how their research affects issues of widespread concern. But they are used to talking about these effects in abstract ways, such as giving statistics about groups of people. The stats are important, but they'll hold more weight and be more memorable for the reader if real people are also written as characters in the narrative. When scientists rattle off statistics but do not talk about how they connect to people's lives, they risk coming off as cold and distant. Anecdotes may not have a place in science writing, but they are absolutely essential to journalistic and literary nonfiction.

9. Use your audience's lexicon.

Introduce only the terms essential to your story and no more. Even certain words likely to be familiar to readers, like "dynamics" or "mitigate," should be avoided just because they sound jargony and can have different meanings in different fields. Look for alternatives that are more direct. At the same time, avoid talking down to your audience. Sometimes scientists try so hard to make sure everyone is on board that it sounds like they're talking to middle schoolers, a big turn-off to most readers.

10. When you feel you are done writing, don't just stop in your tracks once you've added the last bit of information you'd planned to include.

An article needs a conclusion, but one very different from the kind you might write for a typical journal article. Narrative nonfiction conclusions return to the intrigue, suspense, or line of inquiry the writer established to draw the reader further into the article, providing a sense of closure and wrapping up any loose ends. The conclusion is not just a repetitive summary of everything the article has just said. Try to find some forward-looking insights that show greater context for your work.

Here are some articles in our archives that exemplify well crafted conclusions:

- P. Kirk Visscher, Thomas Seeley, and Kevin Passino, "**Group Decision Making in Honey Bee Swarms** (/node/908)," May–June 2006
- Peter Buston and Marian Wong, "**Why Some Animals Forgo Reproduction in Complex Societies** (/node/3533)," July–August 2014
- Kevin Heng and Joshua Winn, "**The Next Great Exoplanet Hunt** (/node/3660)," May–June 2015 [*paywalled, available to members and subscribers*]

11. Avoid passive voice and clunky sentence structures.

Although passive voice is not uncommon in scientific journal articles, it sounds distant, abstract, and stuffy. Today's readers have very little patience for slogging through wordy writing.

12. Write for the readers.

I find that scientists tend to aim their writing toward what they think their colleagues want to read. This is a natural reflex—after all, that's the audience they're accustomed to thinking about when they write journal articles and grant proposals. But a scientist's colleagues will be a minority of the readership of a magazine article. Try to step back, review your own assumptions, and broaden your view of who your audience really is.

When a scientist first attempts writing for the general public, it can sometimes seem frustrating. (Conversely, some scientists **feel stymied** (http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2012_03_23/caredit.a1200033) (http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2012_03_23/caredit.a1200033) because writing in a more literary style than the norm for journal articles is frowned upon.) Yet, science is

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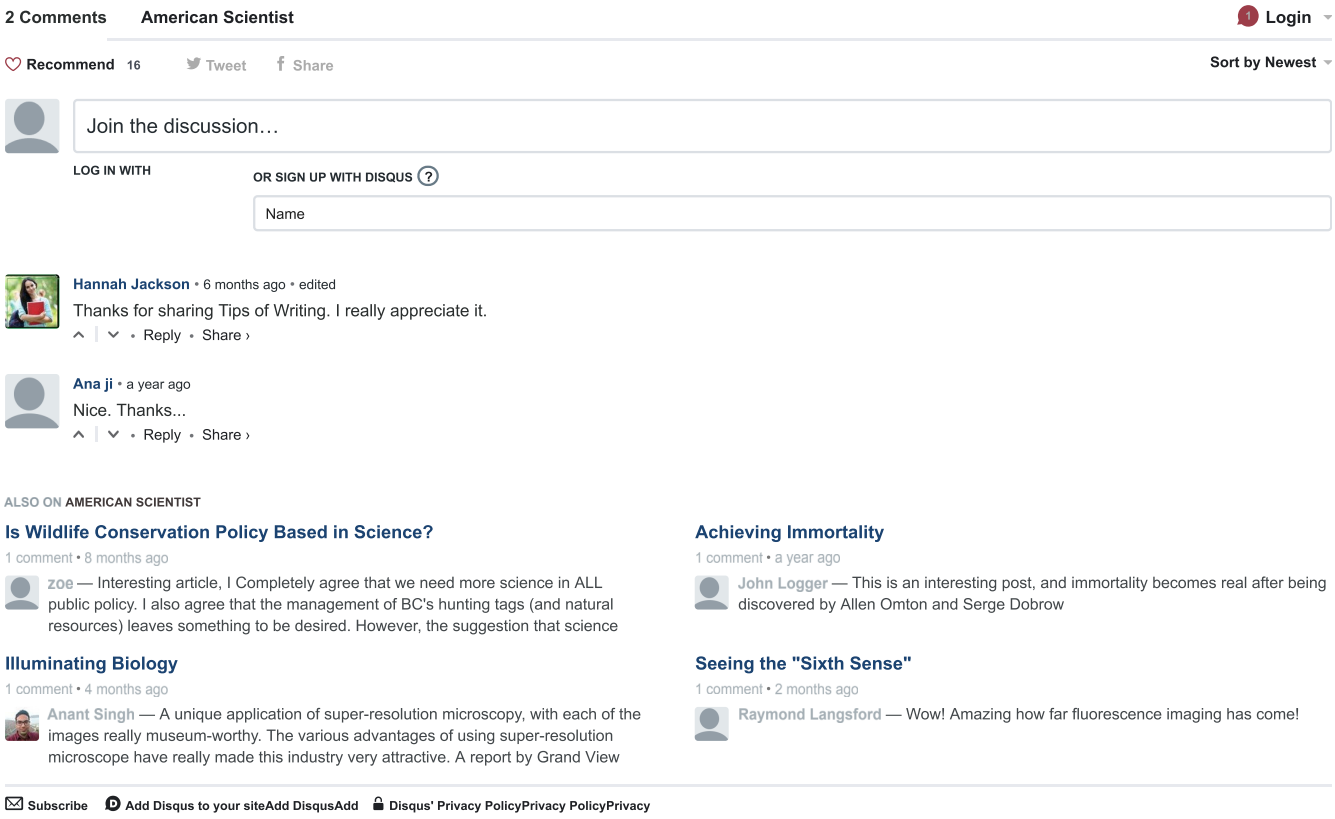
all about challenging existing ideas—learning a new writing style presents the opportunity to broaden your viewpoint as well as that of your audience. In the end, the experience could have an influence on how you approach your research as well as your communication.



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