SCIENCE REPORTING BASICS
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As a scientist doing general audience science writing, you have the chance to explain the science behind a hot topic—or an obscure but important topic. Or perhaps you've found an interesting character in the world of science that you want to highlight. Either way, what you are really doing is telling the reader about the world around them using a scientific lens. The point is to relate the science and its practitioners to the greater world by perhaps tying the work to the environment, health, money, or politics. And it's your job to make a clear, accurate and compelling story for a reader who may not be familiar with science.

This handout is a scanty, bare-bones guide on how to report, interview scientists and write about what you found out. Since you are writing for the Review, I'm going to assume stories are assigned or that you have one in mind. The next thing you'll want to do is start reporting.

REPORTING

The sooner you start, the better. For a magazine feature, give yourself at least a month to report and write. Even if you have a free moment to report, your sources may be really busy with teaching, speaking at conferences internationally, or trying to find funding. Start with background reading, and then move onto to talking with the scientists involved.

If you already know people who are researching a certain topic you're interested in, like breast cancer markers, look for articles about the topic or the scientist in the mainstream press (magazines, newspapers). This will explain the research in plain English. Next, search Lexis-Nexis, the Cal library website databases to read pertinent scientific papers by your specific author. That way, you won't go in cold. While you're reading about their work, write down questions you have, and keep them in mind for when you interview people.

FINDING THE RESEARCHERS

If you've got scientific papers and are looking to talk to the authors, contact info is generally listed along with their academic or corporate affiliations (you'll want to talk with the first and last authors, most likely). For university researchers, you can often find their phone number and/or email address on the web using peoplefinder. For private companies, try asking for a public relations person, or public information officer.

In both cases, call and identify both yourself and the publication you are writing for (you can say freelance if you do not have an official news organization). You can choose to explain it's a campus publication if that will help you get information out of them. Sometimes the best thing to do is tactfully ask to make an appointment to see them in person, so you can have a whiteboard handy for schematic drawings or equations.

Always try to get an ID on who you're talking to—that way if the person is not there, when you call back, you at least have a name to use.

INTERVIEWING SCIENTISTS

The best thing to do is go to the lab in person, if you have the luxury. You will get the best information, meet the most people. Dress nice to show respect to them, and to show you're serious. Also, take good notes. Most reporters use long thin notepads, befittingly called reporters notepads. With a fast talker, you're going to need a mini-tape recorder. However, transcribing will take two to three times the length of your interview. But sometimes it's worth it: a misquote can get you sued or piss off a source. To make a source more comfortable with a tape recorder, you might explain that your purpose is to be able to get the quotes right, to listen to the interview later again for clarity. That said, be prepared to call this person back later while writing the piece to check a quote, ask more questions. You're not being a nuisance, you're doing your job, which is getting it right.

While reporting, try to be present for a physical act that illustrates the science in the story. A scene can explain the science in an active, engaging way. If you can tag along and interview the scientist while he or she is rotating the telescope and squinting with the right eye while finding the outer edge of the universe, that's more interesting than just regurgitating the details of their research gleaned from an academic paper. For magazine articles or newspaper features, pay attention to physical details: what does the lab look like? How does it smell? Paint a picture to bring the reader to the action.

Now even if you are writing for a magazine, the common newspaper rhetoric of who, what, where, when, and why still applies. Even if you think you know the basic tenets or importance of the research, ask the scientist anyway. You are not the expert, otherwise someone would be interviewing you. And ask them to explain it like they would to a child or a dog—you'll get a more easily digestible answer. If you can't get a simplified explanation of the research from a scientist, make sure you understand the science so you can find a simple explanation while writing later. If you run into an inarticulate interviewee, a good way to get a comprehensible explanation is to ask a graduate research assistant working on the project, or even a professor in a related field who can explain the concept to you, though you may not quote that person in the piece.

Questions to keep in mind: What are the discoveries they've made already? Why are they doing the research in the first place (finding a cure, making semi-conductors cheaper, mom has the same type of cancer)? How does it work? How long have they been investigating this area? Who else is working on a similar thing or who do they collaborate with? Where do they get funding from? The last question will not be so important for this journal unless there is an interesting conflict of interest or the story is about funding.

EMBARGOS

Sometimes, a lab hasn't published results yet, though they have good preliminary data. Scientists may tell you things with the agreement that you don't publish it until it's been in a journal.

PROFILES

Profiles are not really just about the work someone does; it's about who they are as a person, and how that relates to what they do. For reporting, that means you might talk to friends, students, secretaries, colleagues, family even. Don't be shy, but prepare for some raised eyebrows. Also, always include a physical description of the person somewhere; it helps define the person in the reader's mind. Imagine there were no photos of Einstein, only articles. Wouldn't you want to know about his crazy hair and mustache, his kind, gentle eyes? Note what sticks out, both in their appearance and their office or lab.

For profiles, you'll want to have at least three interviews with your subjects. Try to see them in several environments: at work, out with friends, whatever. But keep relating their other activities to the core of who they are and what they do. People are best described by what they say, what they do, and what other people say and do to/with them.

WRITING

These are not steadfast rules, and some are even broken in this handout.

STRUCTURE

So you have all this information and need to write. To do this, you'll need a structure, an order to put things in. Articles go something like this: Lede, nutgraff, then the body. Sometimes, the end will link back to the lede, giving the story a sense of completion, but this is not necessary in any way. The following is mostly about ledes and nutgraffs since organizing the body of a piece largely depends on the reporting.

LEDES

There are a few types of ledes, which are just the beginning of a story, maybe the first 2-5 paragraphs (in newspapers, they're about 1 or 2, and in magazines longer). All are meant to draw the reader in with vivid description, detail, mystery, cleverness and/or somewhat of a gee whiz factor. Following are some of the most common ones.

- Anecdotal/narrative: Describes a scene or event, with concrete, physical details. Here's a fictional one:

"Twenty days ago, Jim Lissard's mouse grew a third tail. It slowly emerged from under the white hair to form a lump, and finally, a wiggling pink strand scantily covered with fur.

The mouse, named Pinky, is the first to have the 3tail gene, which can not only spur the growth of a third tail, but prevent cancer." [this last part is actually a nut graff--see below.]

- Straight lede: Subject, verb. "Fourteen years ago, Jim Lissard created the first three-tailed mouse, the current model for cancer research."

- Absurd-question-followed-by-answer lede: "Who would have thought fifty years ago there would be a three-tailed mouse?" Try to avoid this construction. After all, humans can pretty much imagine anything. Use a declarative sentence to make this same point, if you can. Questions in stories, if overused, can be annoying or a sign of a writer's laziness.

NUTGRAF(F)
This paragraph, or group of small paragraphs, tells the reader why anyone should even care to read the article. It ties the science to an important outside issue (money, health, the environment, etc). Sometimes the nutgraff will tell the reader whey they should read the story but do it by posing a question (not literally, necessarily) that will be answered by the body of the article. Will the research lead to a new drug? Make computer chips smaller, enabling handheld instruments to have more power? In other words, what will this research do for readers' lives? How is this researcher changing the world that the reader lives in?

Tension: The nutgraff may also voice a tension or crystallize a conflict set up by the lede. In turn, the tension if maintained can carry the reader through the story and compels the reader to keep turning pages. There are some types of tensions/conflicts that are particularly pertinent to science:

- The race to find the cure/solution: Many labs compete with each other to figure out a larger problem. For example, in The Double Helix by Jim Watson, he pits Linus Pauling against Watson and Crick in the race to find the structure for DNA. This type of drama was also a huge part of the race to sequence the human genome. Sometimes this drama is unjustly used to give life to an otherwise boring story, so be careful. The question here would be, who will get there first?
- The underdog/naysayer: Often there is one scientist who doesn't really travel with the pack. Example: Peter Duesburg (a professor at Cal) who argues that HIV does not cause AIDS. This type of story often lends itself to a profile, and is usually complicated by politics, scientific infighting, funding issues and general intrigue. In other words, really juicy stuff. The challenge is to find out why the naysayer is really being discredited, and if that they're science really holds up.
- The "it'll change the way we think about xyz" story: Sometimes new research comes along and overturns the way the world thinks about a commonly held concept, like the evolution of human life, or the cause of a disease . For instance, the news about the T-rex wasn't really relevant to daily life (i.e., doesn't change the cost of healthcare), but it changed the idea of the T-rex from a speedy, ravenous, meat-eating monster towards something more like a loping, omnivorous dinosaur. Another example is Prusiner's model of prion diseases: he changed the way we view a group of diseases that is destroying the European livestock supply. (But he used to be in the naysayer category for pushing the idea of misfolded proteins being the spreading agent for an infectious disease.)

QUOTES

Interesting quotes or explanations are important for science writing because the material can seem dry or unwieldy otherwise. People often say more interesting things than books, especially textbooks. Also, quotes can break up a dense section of explanatory stuff, or provide color for a story. You need to attribute quotes to a person, generally. In newspapers, you only use "said" after a quote. As in, "'I hate kids," said Mr. Rogers, retired children's television guru.'" Other acceptable terms: "noted" or "added." These are all considered neutral. By strict journalistic standards, you cannot use other synonyms for "said" like "chirped" or "explained." Even "commented" and "agreed" are looked down upon. But in magazine, it's a little more loose.

If you've found an explanation for a concept like DNA replication in a book or paper, it's best to paraphrase it (generally, no attribution needed for magazine since they allow you to assume some air of authority). If you need to use direct quotes or data from a book or paper, attribute it (like if the quotes/data are from the interviewee's work). If you're at a newspaper you'll need to get the scientist to explain the concept and you can then paraphrase them. Common knowledge does not need to be attributed, but your editor will decide what that means.

THINGS TO THINK ABOUT WHILE WRITING

Voice, point of view: Magazines tend to allow more voice, which can be conveyed through word choice, choice of metaphor and imagery. Magazines are not newspapers because they openly express a point of view, but if the voice you choose is condemning or harsh, the reporting should validate that point of view. Generally, avoid second person (a rule not followed in this handout).

Tone and style: lighthearted, dramatic, funny, self-righteous. Sometimes these tones are better left to essays and editorials, though drama and humor can really illustrate a story well. But the drama and humor should come from the reporting: did someone get fired because of their work? During the course of the research will the mice go blind? Does a blind mouse regain vision because of treatment? Just stating the facts sometimes is fascinating enough. A good scene can be ruined by flowery overwriting.

Metaphors: Many science concepts already have a tried and true metaphor. DNA has several, based on the purpose. For example, "DNA, the building blocks of life" is for a quick throwaway explanation, whereas "DNA, the zipper" is for explaining DNA replication. Then there's "DNA, the book of life" for explaining the genome. Some of these stock metaphors are good, and some are totally misleading and inaccurate. Be creative and come up with your own. Just be wary of not using so many different metaphors that they conflict over the course of a piece.

Sentence structure: Unwieldy sentences (generally caused by multiple clauses, lots of prepositions, dashes, parentheticals and too many words) make it difficult and sometimes boring to read piece. Employ vivid nouns and verbs. They paint a picture best and most succinctly.

Jargon: Every field has its lingo. But that doesn't mean you should adopt the lingo. Why? Because physicists may not know anything about plant physiology, and biologists may not understand fractal theory--but they might be reading the same publication. Meaning, if you use a phrase like "astronomical unit," tell the reader that it's equivalent to 93 million miles. To test out story clarity, sometimes it's nice to have a non-science person read through a piece.

FACT-CHECKING
Check quotes, the spelling of names, figures and explanations by calling your sources again and looking up numbers in textbooks. A month after an interview with an illegible notepad demands diligent fact-checking.

RESOURCES

Some of these will be useful for science writing in general even after you are done writing for the Review.

A Field Guide for Science Writers, edited by Deborah Blum and Mary Knudson, Oxford University Press, 1997. A good guide on how to approach science for the public, whether in newspapers or magazine. The official guide of the American Association for the Advancement of Science.

www.sciencedaily.com, www.eurekalert.org

Good for story ideas not originating from this campus. Websites that list the day's interesting/important scientific findings. Some are from academic organizations, some from companies.

AP Stylebook: You can abbreviate California, but not Iowa (states with names five letters or less). Go figure. The bible of capitalization, punctuation and reference in newspapers.

Campus news: http://www.berkeley.edu/news/

Lists talks that may be of interest: a good way to find a story and contact a researcher.

WHAT TO READ (by no means complete)

NEWSPAPERS: New York Times Science Tuesday, The Boston Globe, Washington Post (Rick Weiss), Newsday (Laurie Garrett, Robert Cooke), LA Times (good medical/health coverage). Note: many science pages at smaller papers are now a part of the business page, labeled as biotech, like at the SJ Merc, or the SF Chronicle.

MAGAZINES: New York Times Magazine, Discover (not as good as it used to be, most say), Smithsonian, Natural History, New Scientist, occasionally Outside. Editorial pages of Science and Nature are a must. Harper's or the New Yorker (Steven Hall).

BOOKS: Vast and difficult to summarize.

Some classics:
The Double Helix, James Watson. Gossipy, trashy, and utterly fascinating. How science works behind the scenes, by one of science's true eccentric geniuses.
Cosmos, Carl Sagan. A great primer on the universe.
Silent Spring, Rachael Carson. One of the first and best environmentalism books that started a whole movement. A hard look at pesticides.
Song of the Dodo, David Quammen. A book about the history of evolutionary thought, within the framework of extinction on islands.
The Coming Plague, Laurie Garrett. A great (and long) book on antibiotic resistance as a public health threat by one of the greatest Pulitzer Prize-winning investigative science writers.
Genius: The Life and Science of Richard Feynman, James Gleick. A fascinating portrait of a physicist, and a look at what separates a genius from a really smart person. Also a history of the Bomb, from a scientist's point of view.
Woman: An Intimate Geography, Natalie Angier. A controversial National Book Award finalist about the very meaning of femaleness. By one of the first practitioners of narrative science writing.
Best Science and Nature Writing 2001, edited by E.O. Wilson. A good survey.
The Future of Life, E.O. Wilson. When he writes about biodiversity, it's heaven.

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