Guide to understanding scientific writing. III. Titles

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Prologue: *Reading a scientific paper can be daunting and frustrating, especially if you are unfamiliar to the various conventions of scientific writing. This multipart series of articles is designed to introduce the virgin reader to these idiosyncrasies and decrease communication barriers between science and the public.*

The title of a scientific paper is literally the first thing you will read when opening up a crisp new issue of a journal or furiously scanning your 100th journal email alert of the day. You may think that you are fully capable of understanding the title of any scientific paper, and you are correct to some degree. But because the title often determines whether or not a scientist will read a paper, authors tend to load a lot of nuance in those 12 or less words that can be missed by the non-experienced reader. For example, do you know when an author should use a declarative title over a descriptive title? You don't even know what a declarative title is, do you? For shame…

Oh, c'mon, it can't be that difficult to understand a title. – Oh, really? How about you take a stab at the title of this classic paper: "Familial hypercholesterolemia: Defective binding of lipoproteins to cultured fibroblasts associated with impaired regulation of 3-hydroxy-3-methylglutaryl coenzyme a reductase activity"

Umm, something about eating 3 Hydrox cookies? We give up, what does it mean? – Actually, we don't know. We were hoping you could tell us.

So, why are academic papers titled like this? – There are actually several reasons. First, most academic search engines (like Web of Science or Google Scholar) index entries primarily based on the words in the title. Thus, scientists typically use sciencey-sounding words (e.g., 'familial hypercholesterolemia' instead of 'high cholesterol levels among family members') in titles because they know that those are the keywords other scientists are using in search engines. And the more of these keywords you include in your title, the more likely a scientist will stumble upon your paper. That's why the most viewed paper in 2015 is expected to be: "Robust anisotropic quantum crystallography of metagenomic resonant hybrid equations: A Bayesian analysis."

Also, limits on the length of titles necessitate the use of technical science terms that replace multiple words with one (like using 'hypercholesterolemia' instead of 'high cholesterol').

Doesn't 'high cholesterol' have fewer characters than 'hypercholesterolemia'? – True, that's a good point. But hypercholesterolemia sounds better and smarter than high cholesterol. It's an indicator of the paper's quality. If the author doesn't know the correct medical term for

high cholesterol, then you can safely assume that the they don't know anything at all about science, much less scientific writing. Pfft, I even bet that they're the type of author that states their hypothesis in the Introduction as a prediction! Amatuers…

I have no idea what that is supposed to mean. – You'll have to wait until our Guide to understanding scientific writing. VII. The Introduction.

So, are all article titles this serious? – Actually, no. Some scientists can get quite clever with their titles.

Do you have any examples? – There's actually a bunch. Here's a link to cleverly-titled mathematics articles, here's one for computer science, here's one for psychological science, and here are a couple links to clever titles in general. There was even a contest among Swedish scientists to see who could sneak in the most Bob Dylan quotes in the titles of articles.
     Our personal favorite title from a scientific paper is this one from the journal *Evolution*: "What, if anything, is a rabbit?"

These are all great! Why don't more scientists title their papers like this? – Maybe because science is not a joke? It's a very serious endeavor in which the injection of any attempt at humor or creativity immediately diminishes the quality of the science.

C'mon, that can't be true… – Oh, yeah? Tell that to the authors of this study that showed that psychology articles with amusing titles were cited about 67% less than non-amusing titles. This is Science's way of punishing humor, much in the same way God uses hurricanes to punish the wicked.

Well then, what are some good characteristics of titles I should be looking for? – The best answer to this question is the best answer to any scientific question: a literature review. This study in 2007 concluded that titles with colons (the punctuation, not the organ) were cited more, and this study in 2010 concluded that longer titles were cited more.

Ok, so long titles with colons, then... – Well, not so fast. This study in 2012 found that longer and coloned titles were actually cited less than other titles.

God damnit, now what? – Follow this old scientific mantra: when life gives you equivocal predictor variables, look for other predictor variables! Luckily, that same paper examined how often different types of titles are cited.

What are the different types of titles? – There's many (at least 13), but this particular paper looked at two: results-describing titles and methods-describing titles. The former would be something like: "Shorter grant deadlines result in a 62% increase in Assistant Professor mortality". The latter would be like: "Effects of shortened grant deadlines on Assistant Professor lifespan: a controlled experiment". Results-describing and methods-describing titles are also called declarative and descriptive titles, respectively.
     That study in 2012, by the way, found that articles with results-describing titles are cited more often than the methods-describing ones.

Are there any other major types of titles? – Yes, there are also interrogative titles that use a question for their title; for example, "Do shorter grant deadlines affect mortality in Assistant Professors?" These are best avoided.

Why is that? – Because most readers just snarkily answer "No!" or "Yes!" (depending on the question) in their head every time they see an interrogative title and move on to the next journal article.

Are there any clues about the paper itself that I can pick up from the title alone? – Yes, there are a few. Papers whose titles start with "Effects of.." are probably best avoided. Starting with "Effects of…" is like the default setting for a title and shows that the authors are either trying to rush publication of the study or just putting the minimal effort possible into the paper.
     There's also a distinction between specific and generalized titles. Consider these two:

> 1. Presence of spiders increase nitrogen mineralization rate in grasslands of the Great Plains

> 2. Predator presence determines nutrient cycling in ecosystems

You'll notice that the first title is basically a Mad Libs version of the second title. When you encounter a specific title (like Title #1), most of the information in that paper will almost exclusively cover the sub-

jects mentioned in the title. After reading the article, you will know more about those particular subjects than most people. You will find yourself questioning how someone could dedicate their lives to something as seemingly trivial as nitrogen mineralization rates in spiders. You're also likely reading a journal with a low impact factor.

When you encounter a generalized title (like Title #2), most of the information will be kept vague and ambiguous in order to cover every possible scientific topic. You may be reading about the Law of Conservation of Mass in one sentence only to find yourself immersed in a discussion of Invertebrate Body Plan evolution in the next. You will likely encounter the phrase "first principles." You may never even find out what study species, if any, was used. You're also likely to be reading a higher impact journal because, for reasons still unexplained, this type of writing is seen as better science.

So which type would of title would be good for a beginning science reader, like me? – A specific title would require in-depth knowledge of the research topic, which you probably wouldn't have. A general title would require working knowledge of many scientific concepts, which again you probably wouldn't have. So, maybe you should stick to the humorous titles. At least there's not so many of those to read.