

Comment

Let's get our priorities straight

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Periodically, I like to amuse myself by making little lists. The Christmas holidays sometimes remind me of one I started making as a boy, back in Washington, D.C. It's a list dividing the presents I receive into categories based on my reactions to them. The top category contains 'things I never would have asked for but now wouldn't give up if my life depended on it'. High on this list is my copy of *The Complete Sherlock Holmes*, an omnibus edition of all of Conan Doyle's stories about the greatest detective of all time. My Aunt Ethel gave me that book when I was nine. I had never heard of Sherlock Holmes or Dr. Watson or 221B Baker Street before that Christmas morning. I settled down with the book in my favorite living room chair that afternoon and didn't budge for three days. My mother even brought my meals to me there, but I wasn't really in the house. I was in a magic country of the mind, where the fog rolls in off the Thames and the game is afoot and it is forever 1885. I still own that book. It's on a shelf flanked by *Koufax*, the autobiography of the great baseball pitcher, and my autographed copy of *The Lord of the Rings* by J.R.R. Tolkien, whom I knew during my student days at Oxford. They all fall into the same category of surprise delights. These are the three books I would first save from a fire.

Another category is 'things I really wanted and am glad I got'. My first bicycle is at the head of that list. I like cars, and I can say without boasting that I have driven, and owned, some truly exciting automobiles, but none of them meant as much to me as that first bike. It was a magic carpet that freed me from the boundaries of my own yard, and started me off on a lifetime of wanderlust. My first chemistry set is somewhere on this list too, as is every dog or cat I ever had, plus my first personal computer (a Mac, of course). I bought that last one as a gift for myself, and I must say I admire my taste.

Category three consists of 'things I really wanted and wish I hadn't'. This category seems to have a lot more adult items, which may mean my judgment has gotten shakier with age. For example, I really wanted another African-American judge

on the US Supreme Court - to replace Thurgood Marshall, a great justice and great human being. I got Clarence Thomas. (I forgot to specify such additional qualities as intelligence and compassion.) I really wanted a new direction for structural biology as the field matured. I got Structural Genomics. (I forgot to specify that I didn't want the direction to be downhill.) Several ex-girlfriends are on this list, but good manners - not to mention fear - prevents me from naming names.

But the category that I want to discuss here isn't any of these. It's the one that gets my blood boiling every time I think about it: 'things I really didn't want any part of but got anyway'. George W Bush. Reality TV. The war in Iraq. Male pattern baldness. And of course, supplementary material.

I hate supplementary material. It's one of the worst ideas in the history of bad ideas. It's the scientific publishing equivalent of fighting a land war in Asia. Oh, I understand that publishers love it because by shortening papers it allows them to publish more articles per issue at a lower cost, but I really hate it. And I have lots of good reasons.

First, I despise the name. Supplementary implies something extra. A dietary supplement is added to the normal intake of food. But the supplementary material in a scientific paper isn't extra; it's just the stuff the editors made the author take out of the body of the article to reduce the number of printed pages. Or it's the stuff the authors really don't want you to look at too closely. The point is, it isn't extra, it's just deemed to be less important, like the credits at the end of a movie that go by so fast they're Doppler-shifted. A more accurate term for supplementary material would be 'inferior material' - at least that's how it's treated.

Second, nobody reads it. When was the last time you even downloaded the supplementary material in a paper, much less read it? It's hard enough to find time to download, print and read the actual papers; dealing with the S&M, as I like to

call it, adds several extra steps. Much of the scientific literature is rarely read anyway, but S&M is like whatever they keep in the basement of the British Museum: only a few people ever get to see it, and you sort of wonder about them.

But the main reason I hate supplementary material is that it sends exactly the wrong message about our priorities. What typically gets put into S&M? The details of the experimental methods and often, especially for papers in genomics, tables and figures containing at least some of the primary data. The main paper gets summary figures and cartoons of models based on the data. The stuff my students and postdocs most often need to read - the methods section - is treated like an afterthought. What does that say to young scientists about the value of careful and creative experimental design, the need for good controls, and the importance of making sure that anyone can repeat what you've done? If the journals are emphasizing eye-catching, pithy stuff at the expense of the substantive, doesn't that imply that the first priority is how you sell your work? Doesn't it elevate our conclusions, colored as they are by our assumptions and self-interest, ahead of our observations? If the one thing we as scientists have going for us, our insistence on letting nature speak to us, is relegated to a supplement, then what's fundamental? The background? The conclusions? Only those portions of the results we choose to display prominently?

I understand that genomics experiments in particular produce reams of data. I've seen microarray or genome sequencing papers where the primary results would fill several issues of most journals. There's no cost-effective way to put that amount of material into a published document - short of a book - and I'm not insisting that we even try. Some sort of archive (usually web-based) is necessary for the results of such projects. But this consideration certainly doesn't apply to the methods. How the data were obtained should never be a supplement in any paper. The tendency to marginalize the methods is threatening to turn papers in journals like *Nature* and *Science* into glorified press releases.

I always thought that the most important thing in any scientific paper was supposed to be the data and how they were obtained. Everything else is window-dressing, because it's filtered through the lens of subjectivity. The background, the discussion - these are somebody's opinions. If the experiments have been done carefully and analyzed thoroughly, the data are the only facts in the paper, the only thing that can be trusted. They're what I want to read and understand. The people who obtained the data have the right to tell me what they think it all means, and I often find their opinions useful, but I also have the right to decide for myself. Yes, I can still do that if I dig out the supplementary material, but I shouldn't have to dig. If our priorities are straight, the methods and the data should be the centerpiece. And in the modern era, there's no reason not to put them there.

All online versions of papers should have no supplementary material, period. When I download a paper, I want all the relevant information in one place. If publishers insist on shorter printed documents, how about leaving out the discussion section (it would still be in the online version)? That would send a clear message about what really matters in science.

For me, Supplementary Material has all the charm of the safari jacket someone insisted on buying me back in the 1970s. (The American philosopher Thoreau said that if a man does not seem to be in step with his fellows, perhaps it is because he hears a different drummer. In my case, apparently they thought I was listening to jungle drums.) And so I say to all scientific publishers what I would like to say to everybody who contributed items on this particular list: I did not ask for this. Please take it back.