Comment

The emperor's new shibboleth

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I didn't pay much attention to it at first. It was an item in the morning paper saying that Jacques Derrida, the Algerian-born philosopher, had died of cancer at the age of 74 in a Paris hospital on 8 October. Then I remembered. Derrida, the inventor of what is called 'deconstruction theory', was partly responsible for my being a scientist. Before I explain, let me respond that yes, I know that means he has a lot to answer for. But I'm half serious. I was a literature major in college in the 1960s, when Derrida's new theory swept through the world of the humanities like a rampaging elephant. In essence, deconstruction theory posits that every word in a text has hidden layers of meaning that have been accrued through centuries of historical and cultural processes. The writer is typically unaware of these layers but they can be uncovered by the expert: this is the process of 'deconstructing' the text. Derrida and his followers often argued that these hidden meanings were much more important than the ones that the author intended to convey.

As I said, it was clear at the time that this theory, and others that developed from it, represented the future of the humanities, especially comparative literature, and that was something of a problem for me, because I thought the theory was a load of crud. This was only partly due to the fact that I couldn't understand practically anything that Derrida, or his followers, wrote. It was then that I decided that I might have to consider other career options. It has now become almost impossible for me - and, I think, for nearly anyone other than a handful of cognoscenti - to read a serious book or paper in comparative literature, social criticism, and a number of other branches of the humanities without developing a splitting headache and learning little or nothing. Physics was partly to blame for this. Non-sciences like to cloak themselves in the mantle of theory, and quantum mechanics, with its strange, almost mystical language, not to mention relativity, resonates with many concepts in literature and the social sciences. Unfortunately, this makes it easy for some to invent pseudo-scientific babble that gives their ideas an illusion of greater depth. And for reasons that I don't really understand, this fashion took hold in much of academia right through the 1990s.

For an example of what I'm talking about, try this one, from the cultural theorist Homi Bhabha in "*The Location of Culture*" (London, New York: Routledge; 1994): "If, for a while, the ruse of desire is calculable for the uses of discipline, soon the repetition of guilt, justification, pseudo-scientific theories, superstition, spurious authorities and classification can be seen as a desperate effort to 'normalize' normally the disturbance of a discourse of splitting that violates the rational enlightened claims of its enunciatory modality."

To which I say, "Obviously".

Reading this drivel, it is tempting to conclude that, if the emperor isn't naked, he's at least walking around in his skivvies. The humanities once had a great advantage over the sciences. They were largely a jargon-free zone. Jargon - not to be confused with slang - is specialist technical terminology used by those who work in a particular profession. The word was once neutral but it has come to have pejorative connotations, chiefly because a prime function of jargon nowadays is to create a sense of exclusivity and self-importance. I think that makes it dangerous. And regrettably, the jargon that has polluted the humanities is very much like the jargon that dominates the world of information technology, or the world of physics, or the world of genomics. They all serve as shibboleths.

The Hebrew word shibboleth literally means 'torrent of water'. In the Bible, the word was used to distinguish the Ephraimites, whose dialect lacked a 'sh' sound (they used an 's' in its place), from the Gileadites, whose dialect included such a sound. "And the Gileadites seized the passages of the Jordan before the Ephraimites; and it was so, that when those Ephraimites who had escaped said, "Let me go over," that the men of Gilead said unto him, "Art thou an Ephraimite?" If he said, "Nay," then said they unto him, "Say

now 'Shibboleth.'" And he said "Sibboleth," for he could not frame to pronounce it right. Then they took him and slew him at the passages of the Jordan; and there fell at that time of the Ephraimites forty and two thousand."

(Judges **12:**5-6, King James Version of the Bible).

(See, I told you jargon could be dangerous.) In modern parlance, the term shibboleth is used for any word or expression that serves to distinguish one group from another, or to identify someone as a member of a group. Words or phrases that form part of the specialized jargon of a group are shibboleths because they reveal their users to be members of that group. But shibboleths do more than that. They also keep others out.

It was never easy for non-scientists to read scientific papers, and that's a pity, but as jargon has proliferated it's becoming difficult, and sometimes impossible, for even scientists to read outside their own areas. In an era when genomics needs people who can assimilate data and concepts from a wide range of fields, jargon locks us into narrow specialties. What are physical chemists or computer scientists or biochemists to make of clades and paralogs and LOD scores and all the other shorthand we use?

So here's a simple solution, prompted by my memory of sociology, history and literature before Derrida. I think that all papers published in the life sciences, and especially in genomics, should be required to have their abstracts written in non-specialist prose, using terms that can be understood by anyone with a basic knowledge of modern biology. To illustrate my point, and to show that I'm casting stones at jargon-users without being free of sin myself, here's an abstract from one of my own recent papers, first as it was originally published:

Xylose isomerase (E.C. 5.3.1.5) catalyzes the interconversion of aldose and ketose sugars and has an absolute requirement for two divalent cations at its active site to drive the hydride transfer rates of sugar isomerization. Evidence suggests some degree of metal movement at the second metal site, although how this movement may affect catalysis is unknown. The 0.95 Å resolution structure of the xylitol-inhibited enzyme presented here suggests three alternative positions for the second metal ion, only one of which appears positioned in a catalytically competent manner. To complete the reaction, an active site hydroxyl species appears appropriately positioned for hydrogen transfer, as evidenced by precise bonding distances. Conversely, the 0.98 Å resolution structure of the enzyme with glucose bound in the alpha-pyranose state only shows one of the metal ion conformations at the second metal ion binding site, suggesting that the linear form of the sugar is required to promote the second and third metal ion conformations. The two structures suggest a strong degree of conformational flexibility at the active site, which seems required for catalysis and may explain the poor rate of turnover for this enzyme. Further, the pyranose structure implies that His53 may act as the initial acid responsible for ring opening of the sugar to the aldose form, an observation that has been difficult to establish in previous studies. The glucose ring also appears to display significant segmented disorder in a manner suggestive of ring opening, perhaps lending insight into means of enzyme destabilization of the ground state to promote catalysis. On the basis of these results, we propose a modified version of the bridged bimetallic mechanism for hydride transfer in the case of Streptomyces olivochromogenes xylose isomerase.

And here it is shorn, I hope, of most of its jargon: There is a protein called xylose isomerase that is important industrially because it's used to make high-fructose corn syrup, which is the sweetener in almost everything these days. This protein takes a molecule of the sugar glucose and converts it to a molecule of fructose, which is sweeter. Exactly how the protein does this is not well understood. We know that the protein uses two atoms of magnesium to help it function, and we also know that the first step in what it does is to bind glucose to these metal atoms. Glucose is a ring-shaped molecule but somehow the protein opens the ring up and converts glucose to a linear form before converting it to fructose. We have used X-rays to look at the structure of this protein with something that resembles glucose bound, in both the ring form and the linear forms. With the help of X-rays we can see every atom in the protein and the bound sugar, and from this we have gotten new information about how this protein works. We believe that the protein puts strain on the ring form of glucose, which makes it easier to open up the ring. We also believe that a particular chemical group in the protein, called His53, actually opens up the ring by acting like a solution of a weak acid. Finally, we also believe that during the transformation of glucose into fructose one of the two metal ions moves around a lot, and that this movement helps carry out the chemistry.

That didn't take me any longer to write than the original abstract, it came out shorter, and it was a lot more fun to compose. I bet it's also a lot more fun to read. I don't think we can dispense with jargon altogether - it really does serve as a useful shorthand, so the body of the paper will probably need it. But a jargonless abstract would provide a very nice test for the quality of a piece of work, as well as a built-in detector of deliberate obscurity. If an idea or result can't be conveyed in plain language, how important can it really be? Who knows, maybe even the humanities could give my idea a try.