It's my last post for this year, and I'm going to mine Sheldon Ungar's 2008 paper for more material. Is ignorance a public problem? If so, what kind is it, and are there any solutions to it? Ungar not only declares ignorance to be a social problem, but also claims it is "under-identified" and difficult to "sell" as a social problem.

The latter claim may seem a tad puzzling, given the column inches and tomes devoted to exposing how little most of us know about science, for example. Commentators such as Jesse Kluver and books such as Mooney and Kirshenbaum's 2009 opus leave little doubt that scientific illiteracy is regarded with alarm in at least some reasonably well-informed quarters. Likewise, for more than two decades popularizers such as John Allen Paulos have been warning us about the dangers and costs of innumeracy through his best-selling books. In fact, some people think he invented the term (he points out that he got it from the OED). And, of course, the notion that "those who cannot remember the past are condemned to repeat it" is Santayana's famous aphorism, although the idea behind it did not originate with him.

These lacunae are the sort of thing that Ungar calls "functional knowledge deficits," because they pose dangers or costs to those afflicted by them. But there's another brand of ignorance-as-a-public-problem, namely one of the most successful exports from psychology and behavioral economics. These could be called "functional cognitive deficits," but usually go under the names of cognitive "biases" or "illusions." A fairly extensive (and reasonably accurate) list of these identifies more than 100 of them. Producing books about these has become a cottage industry during the past two decades (e.g., from Gilovich 1991 to Ariely 2008).

The cognitive bias problem is hard to sell for the ironic reason that one of the cognitive biases most of us suffer from is an inflated estimate of our own abilities and a conviction that we perceive reality more or less accurately and completely. This goes for me too, by the way. Moreover, we tend to be a bit testy when our deficiencies in thinking and decision making are pointed out to us. I've observed this in friends, colleagues and students. Most of us are relaxed and comfortable with being taken in by visual illusions, or with finding out (well, up to a point) that our memory is less than perfect. But our hackles become decidedly raised when tests of reasoning or judgment reveal us to be logical blunderers or deluded about probability.

Worse still, many of our cognitive biases or illusions turn out to be exceedingly difficult to get rid of. Unlike knowledge deficits, which can be overcome by absorbing the requisite information, some cognitive habits appear to be stubbornly hardwired. It appears that this kind of ignorance problem is more difficult to solve than the knowledge-deficit kind.

But even the knowledge-deficit version of ignorance lacks a straightforward solution, because there's far too much important knowledge for us to absorb and retain. I've been in the education business for 33 years, so clearly I'm a fan of the notion that, ceteris paribus, more knowledge is a Good Thing. Nevertheless, I'm aware that we educators (and other would-be social influence merchants) face a common-pool social dilemma. In the 2008 book I co-edited with Gabriele Bammer I've called it the "persuasion-versus-information-glut dilemma." All of us with an educational or persuasive interest will want to impose our messages on the public. I teach stats to psychology students, so of course I think that all university students should get an introduction to stats. A specialist in children's literature once seriously suggested to me that a class in children's literature should be required for all university students!

Too many messages in an unregulated forum, however, can drive the public to tune out altogether. The scarce resource threatened with depletion is not information or

knowledge, but attention. Attention is effectively a zero-sum resource (I can't pay full attention to two things simultaneously), whereas information is a multiplier resource (you can give me your information and still hang onto it). So, more and more and more education isn't the solution to Ungar's knowledge deficit problem.

If you need further persuasion, consider all of the stuff known by people in the past that we no longer know. In 1840 Lord Clive wrote: '*Every schoolboy knows* who imprisoned Montezuma, and who strangled Atahualpa." Hands up, anyone? Or take a look at the [curriculum for an Elizabethan schoolboy](#) (I'm not being sexist here; only boys were permitted schooling in both periods I've just mentioned). Or what about good old "how-to" knowledge: Who among us knows the basics of such trades as coopersmith, milliner, or fletcher? One of my colleagues recently told me that his father was a farrier and then congratulated me for knowing what that was.

There's a third kind of ignorance problem, one arising from hyper-specialization. Specialized knowledge doesn't integrate itself. Without people to put it all together we end up with no synthesis, no "big picture." I'm not referring just to "big" in the sense of a grand totalizing framework. This problem manifests itself even within specializations. [John Von Neumann](#) often is said to have been the last mathematician who possessed an overview of that discipline, and he passed away 53 years ago ([here](#) is an interesting discussion of this question). A more quotidian example is the [recent post](#) by Charlie Schulting on the perils of over-specialization in IT. Nor is this problem new, as witnessed by this [1957](#) article highlighting a Stanford University dean's concern about this issue and his proposed remedy for it, or this [1922](#) note on overspecialization in public health care.

This version of the ignorance problem also lacks an easy solution, but in some respects it may be the most urgently in need of one. A moment's consideration of the most important problems facing humankind should suffice to convince you of the need for specialists to be able to not only work with one another but also with non-specialist stakeholders. There are efforts on several fronts to address this problem, some of which go under names such as [transdisciplinarity](#) and [integration and implementation sciences](#). More on these at another time.

It should be clear by now that there are multiple ignorance "problems," none of which have straightforward solutions. In lieu of nice solutions, here are a few pitfalls and fallacies that we can avoid.

1. We can avoid hubris. None of us knows very much, when all is said and done. There is also a vast amount of important stuff we can never know.
2. We can become more aware of what we don't know (within limits). We might even reform some aspects of our educational programs to help future generations in this endeavor.
3. We can bear in mind that we have cognitive biases and mental short-cuts. Some of these are adaptive in certain settings (e.g., hunter-gathering) but not in others (e.g., the casino or stock market). Where these aren't adaptive we can generate computational and other tools to help us.
4. We are not cleverer than those who came before us. We're not even always better-informed than they were. A pertinent observation in the conclusion of Cyril Kornbluth's short story "[the mindworm](#)," is that what many very clever people have not yet learned, some ordinary people have not yet quite forgotten.