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What Science Wants to Know

An impenetrable mountain of facts can obscure the deeper questions

By Stuart Firestein | Apr 1, 2012

Illustration by Oliver Munday

Most scholars agree that Isaac Newton, while formulating the laws of force and gravity and inventing the calculus in the late 1600s, probably knew all the science there was to know at the time. In the ensuing 350 years an estimated 50 million research papers and innumerable books have been published in the natural sciences and mathematics. The modern high school student probably now possesses more scientific knowledge than Newton did, yet science to many people seems to be an impenetrable mountain of facts.

One way scientists have tried to cope with this mountain is by becoming more and more specialized, with limited success. As a biologist, I wouldn't expect to get past the first two sentences of a physics paper. Even papers in immunology or cell biology mystify me—and so do some papers in my own field, neurobiology. Every day my expertise seems to get narrower. So scientists have had to fall back on another strategy for coping with the mountain of information: we largely ignore it.

That shouldn't come as a surprise. Sure, you have to know a lot to be a scientist, but knowing a lot is not what makes a scientist. What makes a scientist is ignorance. This may sound ridiculous, but for scientists the facts are just a starting place. In science, every new discovery raises 10 new questions, as playwright George Bernard Shaw sardonically declared in a dinner toast to Albert Einstein.

By this calculus, ignorance will always grow faster than knowledge. Scientists and laypeople alike would agree that for all we have come to know, there is far more we don't know. More important, everyday there is far more we *know* we don't know. One crucial outcome of scientific knowledge is to generate new and better ways of being ignorant: not the kind of ignorance that is associated with a lack of curiosity or education but rather a cultivated, high-quality ignorance. This gets to the essence of what scientists do: they make distinctions between qualities of ignorance. They do it in grant proposals and over beers at meetings. As James Clerk Maxwell, probably the greatest physicist between Newton and Einstein, said, "Thoroughly conscious ignorance ... is a prelude to every real advance in knowledge."

This perspective on science—that it is about the questions more than the answers—should come as something of a relief. It makes science less threatening and far more friendly and, in fact, fun. Science becomes a series of elegant puzzles and puzzles within puzzles—and who doesn't like puzzles? Questions are also more accessible and often more interesting than answers; answers tend to be the end of the process, whereas questions have you in the thick of things. I can't grasp much of immunology even though I have a fancy Ph.D., but the wonderful thing is that most immunologists can't either—no one knows everything anymore. I can, however, understand the questions that drive immunology. And although I don't pretend to understand much about quantum physics, I can appreciate how the questions in that field arise and why they are so fundamental. Emphasizing ignorance is inclusive; it makes everyone feel more equal in the same way the infinity of space pares everyone down to size.

Of late this side of science has taken a backseat in the public mind to what I call the accumulation view of science—that it is a pile of facts way too big for us to ever hope to conquer. But if scientists would talk about the questions rather than boring your eyes out of their sockets with reams of jargon, and if the media reported not only on new discoveries but the questions they answered and the new puzzles they created, and if educators stopped trafficking in facts that are already available on Wikipedia—then we might find a public once again engaged in this great adventure that has been going on for the past 15 generations.

So if you meet a scientist, don't ask her what she knows, ask her what she *wants* to know. It's a much better conversation—for both of you.