Pseudoscience and conspiracy theory are not victimless crimes against science

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Pseudoscience: we should know better by now.

News of anti-vaxxer movements, demands to teach creationism in schools as science, and dubious claims for the health-giving properties of strange diets is enough to make you wonder if some people have forgotten or forsaken the scientific method entirely.

Astronomer Carl Sagan once said:

In every country, we should be teaching our children the scientific method and the reasons for a Bill of Rights. With it comes a certain decency, humility and community spirit. In the demon-haunted world *that we inhabit by virtue of being human, this may be all that stands between us and the enveloping darkness.*

Despite the progress of education and living standards, the world must seem like a scary place for many people – full of chemicals in the sky, aliens trying to abduct us, and government or corporate conspiracies. As Stephen Hawking drily remarked: "If governments are involved in a cover-up, they are doing a much better job of it than they seem to do at anything else."

What's the harm in 'alternative' science?

What's the harm in applying alternative medicine to treat cancer? Why should others care if I don't vaccinate my children? Such decisions are all too often based on a poor understanding of how science works – and usually guided by someone's commercial interest.

For example, US blogger Vani Hari, known as the Food Babe, claims to research and reveal problems with food (while receiving sponsorship from "natural" food companies). Among her profound research conclusions were that, when studying the effects of microwaves:

Microwaved water produced a similar physical structure to when the

words "Satan" and "Hitler" were repeatedly exposed to the water.

1940s electro-metabograph, claiming to cure ailments with radio waves. No scientific basis of course - but doesn't it look good? Credit: akuchling, CC BY

The truth is that in science there are no authorities. There are experts at most, and even their opinions can be challenged by anyone – so long as there's evidence to back up the argument. When some people are taken as "authorities" and their claims, however wacky, believed, then the subsequent decisions that millions of people may take could harm them or even bring a premature end to their lives.

If that sounds outlandish, consider two "wellness" bloggers from Australia. Belle Gibson punted her wholefood recipes and alternative therapies (available as a book and smartphone app) as a "natural" weapon in her fight against cancer – a cancer she later admitted she'd entirely fabricated. Or Jessica Ainscough, the Wellness Warrior, whose very real sarcoma was not hindered by the "natural healing" pseudoscience she advocated on her blog. Ainscough died in February 2015.

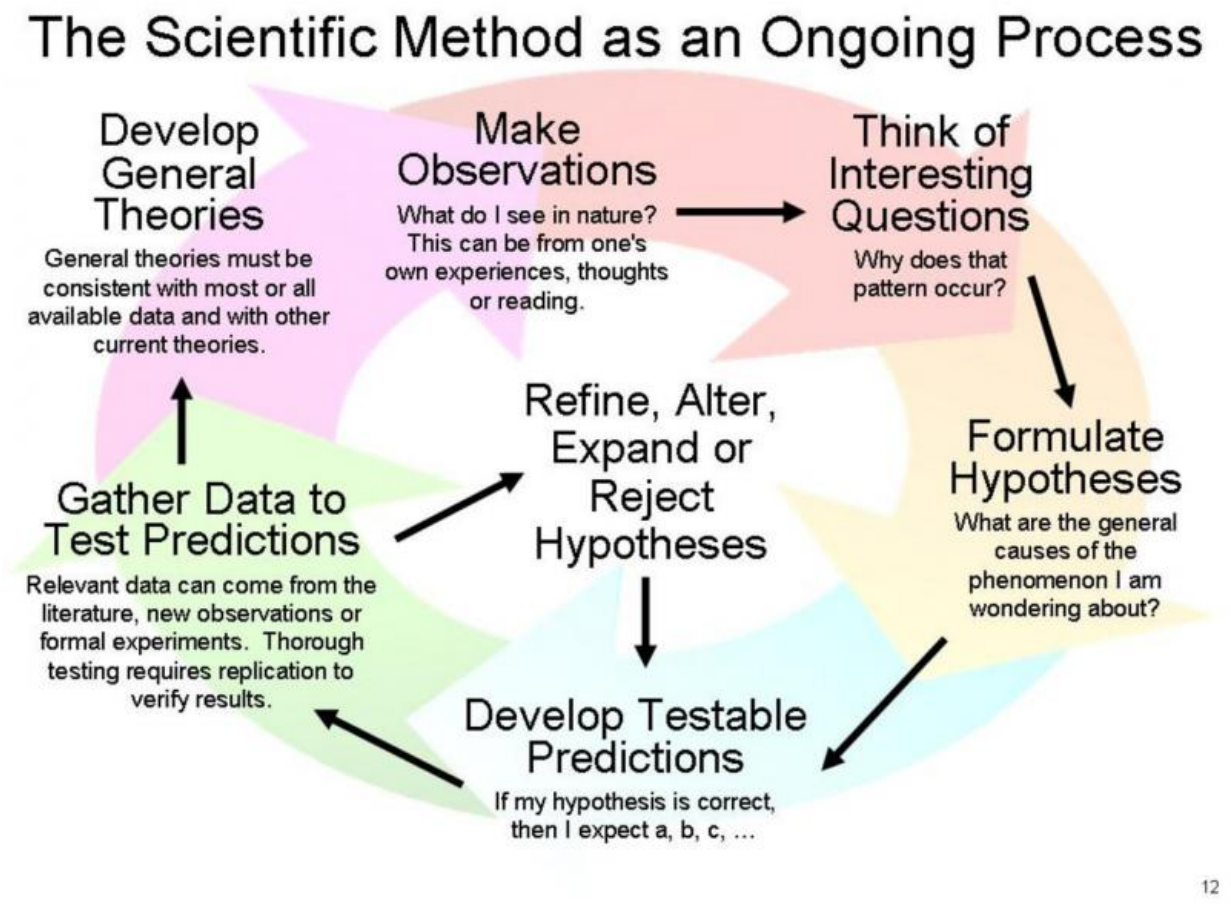
Cancer is terrifying for those facing it and their families. What some of these "wellness" bloggers do whether misguided or for the sake of personal profit is not only an insult to these people and those that have lost loved ones to the disease, but also an irresponsible act.

Similarly, the misinformation and ignorance of science of the anti-vaxxer movement not only endangers their own children but also affects the lives of the rest of the population.

The spread of pseudoscience can kill, and that's exactly why we should be doing more to spread understanding of the scientific method, to equip others to apply scepticism in the face of extraordinary claims.

The demon-haunted world

But instead of teaching children how to critically analyse the world around them for themselves through a lens of healthy scepticism, the educational system is based on arguments from authority, encouraging them to accept what they're told. Over time, this may develop into a deep ignorance of a scientific approach resulting in a huge difference in outlook and approach to the world between the scientifically trained and everyone else. Into that gap steps mistrust, charlatans and conspiracy theories.



Scientific enquiry, in a nutshell. Credit: Whatiguana, CC BY-SA

The world we have is bound up with science and technology, yet very few of us understand that science and technology. This is a recipe for disaster, and in the 20 years since Sagan's book: The Demon-haunted World: Science as a Candle in the Dark was published, the situation has not improved.

It can be difficult for someone without a university education – or even without a scientific degree – to understand and interpret scientific

results. Even those working in one scientific field can struggle to understand developments in others, due to the extent of specialisation required for further progress. Mastering this specialisation requires time, of which we humans have only a limited amount. Gone are the days of all-purpose geniuses such as da Vinci and Leibniz, whose expertise stretched from maths, mechanics and invention, to philosophy, politics, anatomy and medicine.

Closing the gap

Lucky for us, knowing all is not a requirement for scientists, nor even for scientific thinking. In fact truly scientific thinking echoes Socrates' words, that the wisest of men is he who knows that he knows nothing. "There is no shame in not knowing," Neil deGrasse Tyson said. "The problem arises when irrational thought and attendant behaviour fill the vacuum left by ignorance."

The only requirement for scientific thinking is to learn how to apply the scientific method to what we encounter in our daily lives. That is what scientists should be teaching others – science is the only approach to the truth we have, error-correcting machinery connected to self-criticism that tests our ideas against the real world. And the proof of its veracity is all around you – from the scientific principles that underlie the screen you're reading this on, to the manufacturing processes and materials required to build it, and the electricity that powers it.

Science might not be perfect but it is the best tool mankind has developed to understand itself and the world around us. With a grasp of the scientific method the world is suddenly revealed not as a place to be feared, but to be understood. As Carl Sagan also said: "There are wonders enough out there without our inventing any."

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