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How to spot the crackpot — pseudoscience in Pakistan

Bogus science is rising everywhere. A reason for that science behind everyday stuff is now more involved than before.

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These days astonishing science claims abound in the media (there's one fairly recent one in this newspaper too!). For example, a self-taught engineer in Swat claims he can "fix Pakistan's energy problem in 3 years" by splitting water to produce free electricity. Last year, a Fellow of the Royal Society from Pakistan published an article saying that the HAARP (High Frequency Active Auroral Research Programme) experiment in Alaska caused floods and earthquakes in Pakistan. Then there are hucksters who run companies which freely advertise "magnetised water" for boosting crop yields and making mangoes taste better. Of course, this is laughable nonsense because every scientist knows that water cannot be magnetised.

Bogus science is sharply rising everywhere. One reason is that the science behind everyday stuff is now more involved than it used to be. For example, until 30-40 years ago, you could understand how every part of your radio or car works using principles learned at school. That's not true anymore. So, even in advanced countries, large swathes of the population are at the mercy of scientific fraudsters.

Fortunately, this does not mean detecting pseudoscience is a hopeless task. Indeed, this article purports to provide the reader with a do-it-yourself guide for spotting quack science. But be warned that although such guidelines can be helpful, more may sometimes be needed.

To begin, let's look at the sort of quackery around us. Consumer stuff is relatively harmless. If a woman has fallen for some advertised facial "magic cream" that will change her complexion from '*sanwali*' to '*gori*', then that is her stupidity. And if someone actually tries out herbal recipes for baldness, there's no tragedy there. Ripping such people off is just a voluntary self-administered tax on ignorance.

But other forms of quackery can be less benign and potentially damaging to health. Supporting quack science can also harm the credibility of official bodies. For example, aromatherapy (curing through smelling aromas) and chromotherapy (curing through looking at different colours) have zero scientific validity. But quack scientists propagating this junk science receive official support for "research" from Pakistani government organisations such as the Higher Education Commission.

A recent physics thesis, which resulted in the award of a PhD degree by the University of Balochistan, has stirred some controversy. Guided by a "HEC meritorious professor", and with publications paid for by the HEC, it was entitled "A quantitative study on chromotherapy". Several notable Pakistani physicists, who actually know their subject, said the thesis was nonsensical. But after months of trying they still failed to convince the HEC. As a last-ditch effort, I sent a copy to physics Nobel Prize winner (1979), Steven Weinberg, and another to the physics Nobel Prize winner (1988), Jack Steinberger.

Weinberg wrote a point by point criticism which ended up saying: "I am appalled by what I have seen. The thesis shows a lack of understanding of the fundamentals of physics. This thesis is not only unworthy of a PhD, it is positively dangerous, since it might lead patients with severe illnesses to rely on 'chromotherapy' rather than on scientific medicine. I find it difficult to understand how this thesis could have earned its author any academic degree".

Steinberger was equally shocked: "A reasonable physics department should not have accepted anything like this work.... Following world news this past decade, I have been very unhappy about the Pakistani political instability and social problems, but I had imagined that its cultural level was better than what I now see."

To move to general principles, any time that you hear some unusual or astonishing scientific pronouncement, or some claim

of a breakthrough, there are three questions that you should immediately ask: First, is the person involved actually qualified? Could he/she pass a beginning level professional examination in the subject? For example, an engineer who knows the second law of thermodynamics would never claim inventing a machine that runs without fuel. This law is one that every undergraduate student of physics and chemistry has to know well; it says you cannot get energy for free.

Second, how has the claim been announced? Quack science gains publicity through mass media and press releases but avoids professional journals or conferences. For example, in spite of continued superstition that surrounds HAARP, one cannot find a single academic paper written by a meteorologist, published in a scientific journal, which supports the claim that HAARP can cause weather change.

Third, using the alleged “revolutionary” idea or theory, has any machine or piece of equipment actually been built and shown to work? Hand-waving and loud talk does not work in science, or in industry. Similarly, if a purported invention or new process has an unusually long gestation period without commercialisation, then this suggests that there’s something wrong.

While the above guidelines are often good for quack-busting, they cannot resolve all controversies. For example, take the dispute currently raging in the media. Two of our most celebrated bomb-makers, Dr Samar Mubarakmand and Dr A Q Khan, have locked horns on whether coal from Thar can be gasified underground in a commercially viable way. One notes that neither is a mining engineer, or is known to have earlier experience in the field.

In repeated articles, interviews and TV appearances, Dr Mubarakmand says that his gasification project will change Pakistan into a mighty Saudi Arabia of coal. Bitterly criticising those in the Planning Commission who say that his pilot project has flopped, he demands another 105 million dollars to carry on. But Dr Khan says the project is doomed to fail, and “my sincere and considered advice is to give the Thar coal project to Shenhua Group of China”.

This controversy cannot be resolved without transparency, data, and an independent evaluation by experts familiar with mining, chemistry, soil mechanics, and hydrology. Because none exist in Pakistan, perforce such experts should be sought in Australia, China, or elsewhere. Common sense says that a detailed, independent feasibility plan is the very first step in a mega project. Why the Planning Commission has not already done so is a mystery.

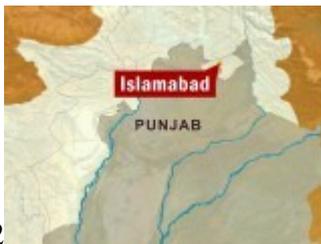
Quack science does not just cost money. It also confuses people, engages them in bizarre conspiracy theories, and decreases society’s collective ability to act sensibly. The good news is that simple common sense is often enough to boot out the quacks. The bad news is that we don’t exercise common sense often enough.

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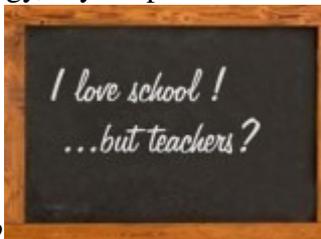
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