

Don't Risk Getting Confused with Hazard Q&A with Dan Gardner



There is an important difference between a hazard and a risk, notably whether exposure and probability are considered. Dan Gardner – consultant, New York Times best-selling author of books about psychology and decision-making, and senior fellow at the University of Ottawa's Graduate School of Public and International Affairs – humorously explains the difference below.

What is the difference between a risk and a hazard?

The words “risk” and “hazard” mean very different things to specialists and everybody else.

For specialists, they have very precise definitions: A “hazard” is something that could go wrong, while a “risk” is the probability of that thing going wrong. A motorcycle is a hazard, but as I have never been on one, and never shall, it's not a risk for me.

But that is not how the general public uses these words. For most people, “risk” and “hazard” are synonyms. They both mean “something that may go wrong.”

When communicating with the public, specialists must be careful to use the public's language. Doing otherwise creates a risk — or hazard — of misunderstanding and confusion.

Why should all chemicals, including pesticides, be regulated based on risk and not hazard alone?

Because probability matters. In fact, probability is all that matters.

Consider that at this very moment, as I type these words, it is possible that a meteor will plunge from the sky, crash into my house, and snuff out my life. (If I finish what I am writing, you will know it did not happen. Wish me luck.)

Of course, I am quite confident I will not be killed by a meteor. Why not? It's a real hazard. At any moment, I could be crushed like a tin can. You could. Anyone could. And yet, no sensible person will ever give a moment's thought to that hazard — because while the *possibility* is real, the *probability* is microscopic.

“Death by meteor” is obviously an extreme example. But there are countless highly improbable threats to life and limb which we all quite sensibly choose to ignore. We couldn't get out of bed in the morning if we didn't. Life is all about probability.

Why and how is chemophobia working against the public's best interest?

Wanting to understand the chemicals in our environment and their effects on human and environmental health is entirely reasonable. But that understanding can only come from scientific inquiry, not unscientific intuition. Unfortunately, a great deal of public concern stems more from intuition than science, and when that happens, we get chemophobia.

A simple illustration: Imagine that scientists determine that Substance X can cause cancer if ingested in amounts above a certain level. Substance X is an ingredient of a pesticide. The pesticide is sprayed on fruits and vegetables. Traces of the pesticide remain on the fruits and vegetables when they are bought in supermarkets and testing shows that people who eat them have detectable quantities of Substance X in their bodies. We know from much research that most people find that alarming. Intuitively, that food feels contaminated. Poisoned. It is dangerous. Stay away.

But is that reasonable? A scientist would say everything depends on the quantities involved. Notice that I never said anything about that. It's possible the quantities are high enough that, yes, people should be concerned. But it's also possible the quantities are incredibly tiny and there is no scientific evidence that quantities that small are harmful. In that case, there's no scientific reason for concern. But when intuition is shouting "poison!" scientific reasoning typically goes out the window.

And that can be harmful. To continue my example, let's say you are intuitively alarmed that traces of Substance X are on fruits and vegetables — although only in minute quantities far lower than those required to present a real danger — so you decide to buy only organic produce that has no traces of Substance X. Does that matter? Maybe not. The organic produce is much more expensive, but you are wealthy. The price of food doesn't matter to you. But what about everyone who isn't so wealthy? What about the people who care a lot about the price of food? If they intuitively feel that conventional fruits and vegetables are dangerous, and they can't afford to pay a lot more for organic, they may simply buy less fruit and vegetable. That would be very unfortunate. There is good evidence that eating fruits and vegetables can protect against some types of cancer, but they must be eaten in sufficient quantity to obtain that benefit. Thus, an irrational fear of Substance X could lead to a change in behaviour that would increase the risk of cancer. Bad decisions have consequences.

And hey! I'm done writing and I haven't been crushed by a meteor. Probability rocks.