The Lies Of Science Writing

By LAWRENCE KRAUSS

Writing about science poses a fundamental problem right at the outset: You have to lie.

I don't mean lie in the sense of intentionally misleading people. I mean that because math is the language of science, scientists who want to translate their work into popular parlance have to use verbal or pictorial metaphors that are necessarily inexact.

Here is where the art of science writing for the public truly lies. Choosing the proper metaphor can make all the difference between distorting science and providing an appropriate context from which nonscientists can appreciate new scientific findings and put them in perspective.

Not only is a good picture, even a mental one, worth at least a thousand words, but many scientists themselves think in these terms. Albert Einstein was famous for his *Gedanken*, or thought experiments, which he used to come up with both his Special and General Theories of Relativity long before experiments existed that could test them directly. His popular expositions on these subjects are still delightful and accessible today because they are full of pictures of trains, elevators and clocks.

Though metaphors are useful in trying to understand complicated scientific ideas, they have their pitfalls. Consider the demonstration many physicists use to describe the bending of space by matter: putting a bowling ball on a rubber sheet and watching it produce a deep indentation. This nicely shows how the sun curves space around it and how this affects the motion of other objects moving nearby.

But it's also a scam. The ball bends the rubber sheet and pulls in other objects simply because the whole apparatus is sitting in Earth's gravitational field. This image also gives many people the false impression that when we talk about curved or flat spaces, we are talking about two-dimensional surfaces embedded in a three-dimensional space and not about three-dimensional curved spaces themselves.

Consider another famous scientific metaphor, the evolutionary biologist Richard Dawkins's idea of the "selfish gene." This is a brilliant and simple way to explain that natural selection relies on the self-perpetuation of genes that promote higher rates of survival. But for some critics, it suggests an intentionality that is absent in the process of evolution. Others worry that it implies an immoral world where selfishness wins out.

When used effectively, an apt metaphor can enhance the real purpose in writing about science for the public: provoking interest and a desire to learn more. Good teaching, after all, is really a matter of seduction. You have to tailor your material to win your audience's attention.

Years ago I wrote a book called "The Physics of Star Trek," which ended up being much more successful than I expected. People are intimidated by physics, but not by "Star Trek." Topics like time travel and wormholes are at the heart of ongoing debates in theoretical physics. Fortunately, most of my readers thought of them as fascinating science fiction rather than as hard science. Captain Kirk and Captain Picard provided me with lots of useful conversation-starters (no, don't expect a transporter anytime soon). They let me seduce readers into learning about how the real universe trumps "Star Trek" almost every time.

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