

But the surreal nature of physics is precisely why it needs the help of artists. The science has progressed beyond our ability to understand it, at least in any literal sense. As Richard Feynman put it, "Our imagination is stretched to the utmost, not, as in fiction, to imagine things which are not really there, but just to comprehend those things which are there." It's a brute fact of psychology that the human mind cannot comprehend the double-digit dimensions of string theory, or the possibility of parallel universes. Our mind evolved in a simplified world, where matter is certain, time flows forward and there are only three dimensions. When we venture beyond these innate intuitions, we are forced to resort to *metaphor*. This is the irony of modern physics: It seeks reality in its most fundamental form, and yet we are utterly incapable of comprehending these fundamentals beyond the math we use to represent them. The only way to know the universe is through analogy.

As a result, the history of physics is littered with metaphorical leaps. Einstein grasped relativity while thinking about moving trains. Arthur Eddington compared the expansion of the universe to an inflated balloon. James Clerk Maxwell thought of magnetic fields as little whirlpools in space, which he called vortices. The Big Bang was just a cosmic firecracker. Schrödinger's cat, trapped in a cosmic purgatory, helped illustrate the paradoxes of quantum mechanics. It's hard to imagine string theory without its garden hose.

These scientific similes might seem like quaint oversimplifications, but they actually perform a much more profound function. As the physicist and novelist Alan Lightman writes, "Metaphor in science serves not just as a pedagogical device, but also as an aid to scientific discovery. In doing science, even though words and equations are used with the intention of having precise meaning, it is almost impossible not to reason by physical analogy, not to form mental pictures, not to imagine balls bouncing and pendulums swinging." The power of a metaphor is that it allows scientists imagine the