SETI and the SCIENCE WARS

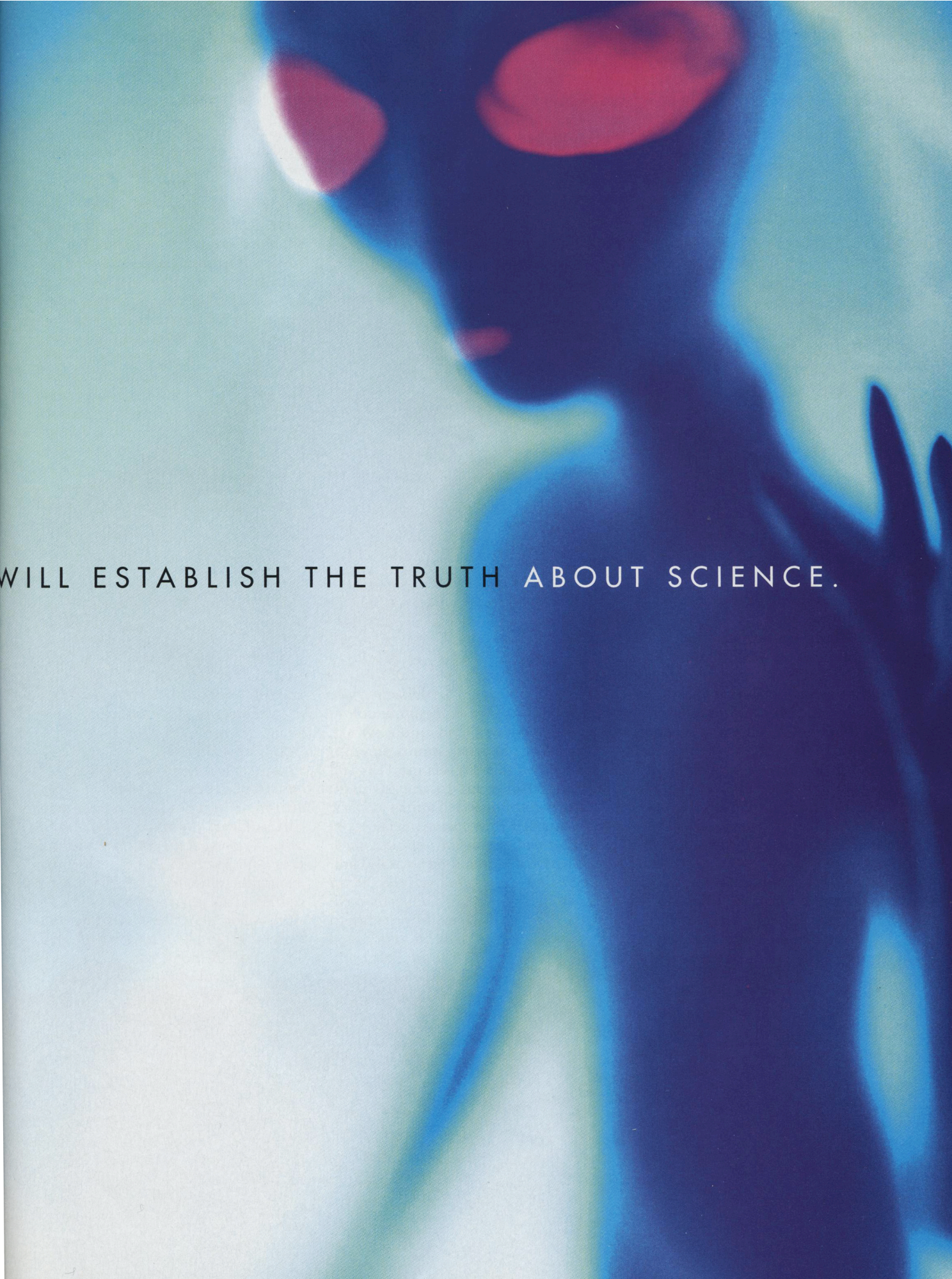
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HOW CONTACT WITH INTELLIGENT ALIENS

If and when we finally make contact with an alien civilization, will we be able to understand each others' science? An answer to this question could put science in its place in a way that nothing else could.

Have you heard about the "science wars" currently raging in academia? If not, you're luckier than I am. At the core of this conflict are some vital questions regarding the nature of scientific knowledge and the quest for objective truth, questions that have become stuck in a quagmire of obscure academic debate.

The wars have arisen in response to the advent of "science studies" — which seek to study the culture of science and the nature of scientific knowledge. Many scientists I know wish that science studies would just go away. Some of this acrimony is due to cultural differences between the sciences and humanities, in particular to differences in language and writing style.


WILL ESTABLISH THE TRUTH ABOUT SCIENCE.



HOW MUCH SCIENCE IS INVENTED AND HOW MUCH IS DISCOVERED?

What really rubs some scientists wrong is the postmodernist penchant for dismissing scientific knowledge as culturally derived. The extreme relativist position would claim that a scientific paper is just another text, another story wholly constructed in the culturally embedded mind of the scientist and subject to his or her particular biases and experiences. So if Newton had been born in another place and time would his inverse square law of gravity have been an inverse cube law, with falling bodies following different paths? I don't think so. Most anyone who has experienced scientific discovery has a strong conviction that the universe is trying to tell us something. We know that, however imperfect our process, we are on to something real. It's insulting to be told that our results are illusion and social construct.

On the other hand, the history of science is one of indirect progress toward elusive goals. It is full of false starts, dead ends, and fads. We have found ourselves stuck for decades in temporary cul-de-sacs, with consensus masquerading as ultimate truth. How do we know which of our current truths will one day be found to be just one of these temporary diversions?

NO TRUTH?

Looking at the history of science in this way makes it clear that, at any given historical moment, scientific knowledge is culturally specific. This doesn't mean that there is no objective truth that we can discover, only that any knowledge we have of it is limited. We approach the truth on a certain trajectory that is culturally and historically determined. Thus Newton's gravity has not been shown to be wrong but revealed by Einstein to result from the geometry of spacetime. In the same way, Einstein's visions will no doubt be encompassed by an even larger framework. Everyone knows that plate tectonics and continental drift are the ways of the world, yet less than 50 years ago these were seen by most Earth scientists as heretical and wacky schemes. The timing of these discoveries and the way in which they've become accepted by scientists and later percolated out to the average Joe are highly dependent on history and culture. So in these respects science is culturally determined. The interesting question then is to what extent is current science actually revealing to us some bedrock reality of our universe?

Certainly scientists should be at least as interested in these questions as sociologists, philosophers, and historians. The subject of science studies is a valid and fascinating one even if some of its more vocal practitioners advocate extreme views that are at odds with the intuition of working scientists. These, of course, trigger nasty, extreme responses. Clearly the entrenched partisans of either side need to get out more. The "wars" are largely the product of academic compartmentalization and the unnecessary divide between science and the humanities. The core question remains: How much of science is invented and how much is discovered?

How do we test our scientific knowledge to see if it is really universal? The answer lies in SETI: The Search for Extraterrestrial Intelligence. Our current radio searches do not need further justification. They are an inexpensive way to possibly address one of the most profound questions we can formulate: Are we alone, or do we have living, thinking counterparts in the Galaxy? But SETI can also serve as perhaps the ultimate test of the relativistic or absolute nature of scientific knowledge. If we make contact with ETs and can communicate with them, then we will find out if we both have discovered the same physical laws. It doesn't seem likely that their music, poetry, art, or literature will resemble ours, if they have anything that even fits in these categories. But if we are right that our scientific laws are intrinsic to the universe, not just our imaginations, then ET should have discovered the same natural laws. And this would constitute proof of the absolute, objective nature of some scientific truths.

It is tantalizing to think that we might be able to learn from the scientists of another thinking species and to see how closely their models of atomic and molecular structure resemble ours. It seems possible to me that some kind of science will be the one thing that we have in common with them. (Although, who knows, maybe they'll also enjoy gangsta rap and *The Simpsons*.)

Actually, we will never be able to find them at all with our current methods if our science is not, in some sense, universal. Radio communication seems to us a good way of sending information across the void, so we imagine ET will reach the same conclusion. We picture a universe full of creatures, probably carbon-based, searching the sky and occasionally broadcasting with parabolic radio telescopes. This requires them to have investigated the same universe with whatever kinds of minds they have and discovered some of the same physics. So, although we do not usually think of it as such, our participation in these searches is really an act of faith. SETI requires faith in the possibility of universal scientific knowledge that transcends galaxy of origin.

DECODING A MESSAGE

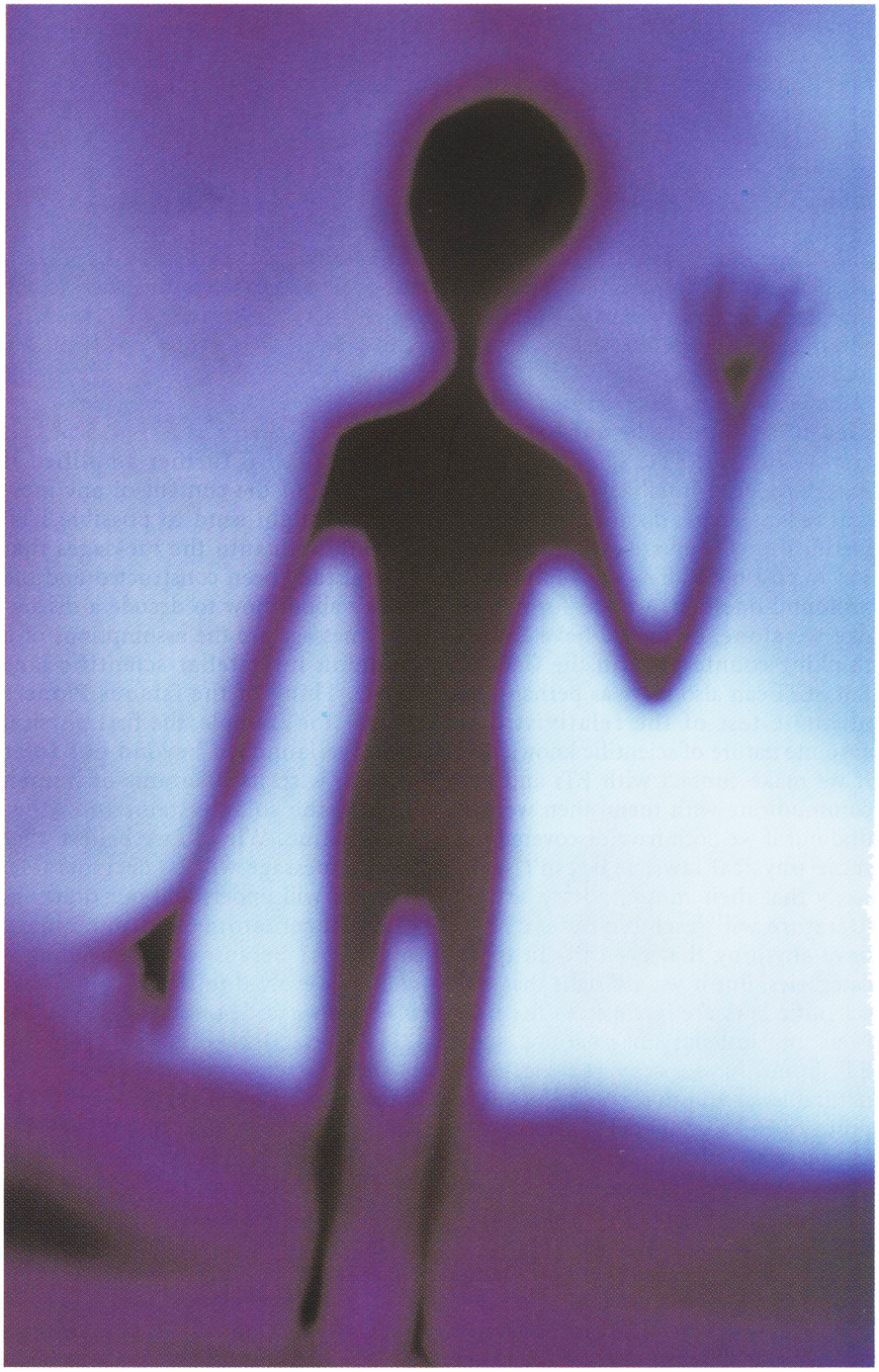
This point is further amplified if you think of the content of any message we might send to possible ETs. Indeed, built into the messages that have already been constructed and the theory about how to decode a discovered message are the assumptions of a common interstellar scientific language. Think of the famous Pioneer plaque, for example, the first physical message launched beyond our solar system, with its diagrams of human bodies, the solar system, and other information. Why do we believe that such a message will be decipherable, that ETs will understand our drawings of hydrogen atoms and our binary arithmetic? Because anyone reading it will have evolved in the same universe in which we find ourselves.

Wherever they live, hydrogen also has one proton and one electron. If they've intercepted the Pioneer craft, then they have some kind of science and technology. We assume that they will know what hydrogen atoms, planets, and pulsars are. We imagine our science to be so good and our models so powerful that they will be recognizable to others with whom we have nothing in common but our universe of origin. But if atoms and molecules

FOR SETI TO WORK REQUIRES THAT WE HAVE DISCOVERED SOME TRUE ASPECT OF THE UNIVERSE.

are constructs of our imaginations, then why should we expect aliens to have similar concepts? It is no coincidence that many SETI pioneers have been members of skeptics organizations advocating a hard-core materialist world view, not tolerant of alternative interpretations of nature. A reductionist, universalist scientific philosophy is an unspoken assumption of SETI.

Ironically, SETI itself may be one of the best examples of a socially constructed science. Since it is, at least as of this writing, a science without a subject, it consists largely of reasoned speculation about possible ET civilizations. A lot of this involves trying to second-guess the behavior and motives of alien races. This inevitably requires extrapolations from certain interpretations of our own history and possible futures. For example, at a recent meeting, scientists argued over whether advanced aliens would bother to actually travel interstellar distances or would prefer to stay at home and send radio messages. Interstellar travel, it was argued, would simply be too expensive and time-consuming so there's no way that any intelligent alien race would make the journey, and this explains why — in a universe so full of potential homes for creatures and civilizations — we haven't encountered any. Other arguments drew on analogies from Earth history, deriving patterns from the golden age of ocean navigation and extrapolating to theories of alien interstellar migration. It is easy to see how this kind of science is hugely dependent on our own biases, assumptions, and culture. I am highly suspicious of any theory of alien behavior that rests on analogies from or extensions of our own history or experience. My hunch is that alien behavior will be disturbingly strange and inexplicable to us.



LEAP OF FAITH

Yet I do believe that there are some universals that we will recognize in the alien version of the Richard Feynman Lectures on Physics. Unlike some hard-core skeptics, I recognize that this belief is based in part on faith. But I argue that my kind of faith in universal scientific truths is testable. For SETI to work requires that we have discovered some true aspect of the universe. Therefore, SETI is a test of our faith in science, a test of the nature of scientific truth.

Are scientific truths invented or discovered by humans? Are our scientific laws and discoveries constructs of the human mind or are they revelations of aspects of nature that exist completely independently of us? One surefire way to find out would be to borrow a physics textbook from the nearest ET and compare notes. A

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