



Summary

Dr. Douglas Vakoch describes international efforts to contact aliens and explains the difference between METI (Messaging to Extraterrestrial Intelligence), or intentionally transmitting signals to nearby stars, and SETI (the Search for Extraterrestrial Intelligence), which uses powerful radio telescopes and other devices to listen for intelligent life on other worlds and helps us understand our place in the universe. Vakoch argues that efforts to understand what the universe is made of, or search for life or advanced civilization on other worlds, provides us an opportunity to understand ourselves better and study what it is that makes humans unique.

Interstellar Communication as a Common Horizon for Humanity

Dr. Douglas Vakoch

Dr. Douglas Vakoch, president of METI International, describes efforts to contact aliens and explains the difference between METI (or Messaging to Extraterrestrial Intelligence), that is, transmitting intentional signals to nearby stars, and SETI (the Search for Extraterrestrial Intelligence), which seeks to help us understand our place in the universe with use of powerful radio telescopes to search for life beyond Earth.

Vakoch argues that efforts to understand what the universe is made of or search for life or advanced civilizations on other worlds, while valuable for its own sake, also provides us an opportunity to understand ourselves better and learn about what is unique to Homo sapiens. He thinks that this search provides a lens through which we can view some of humanity's most marvelous creations or discoveries and reflect on the nature of science and mathematics. Even if do not discover life in the universe after many years or decades or even centuries of searching, he believes we are guaranteed to achieve a better understanding of ourselves.

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Vakoch points out that humanity's fascination with life beyond Earth is not new. If we go back to ancient civilizations on Earth, we see some of the first recollections and reflections on whether we are alone in the universe. We see, for example, the Greek philosopher Metrodorus in the 5th century BCE saying that to consider the Earth the only populated world in infinite space is as absurd as asserting that in an entire field sown with millet, only one grain will grow. Vakoch also underlines the importance of the argument made by Carl Friedrich Gauss, the German mathematician, who suggested that we might in fact want to try to contact other civilizations, and the natural place to look for life was the moon.

Vakoch also describes how early scientists devised ways to contact aliens. Gauss, for example, suggested carving out huge swaths of the Siberian Forest and planting fields of wheat on them in the shape of a triangle. Austrian physicist Von Littrow, on the other hand, advised carving a huge circle ten kilometers in





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diameter in the Northern African desert and filling it with kerosene that could be seen by aliens especially at night, when the dark side of Earth faces the moon. The notion of using the circle as our first message to extraterrestrials is something that continued right down to the 1970s.

Vakoch says that as the 19th century progressed, it became increasingly clear that the moon was not a habitable world, and scientists started getting very interested in Mars while viewing its surface through telescopes. As they saw patterns that some said were perhaps signs of engineering feats, of canals that could bring water from one part of the planet to another, Mars became a much more likely site of life. Our distance from Mars makes it impractical to use a triangle in Siberia or circle in the Sahara Desert as visible markers, new strategies were devised to reach out to such civilizations. In 1869, French polymath Charles Cros suggested simply sending a series of light beams, stacked to show a picture because the beams don't have a message in themselves. He proposed using different methods, such as sending a series of pulses, to find a way of reconstructing a message.

In the 1920s, the Neiman brothers suggested a scheme very similar to Cros, but instead of just sending pulses in different ways, suggested using Morse code—dots and dashes—with pulses that are either very brief or very long, as a way to signal other stars.

As scientists learned more about our solar system, they realized that Mars might have been the home to microbial life in the past, but it really doesn't have a suitable environment to support intelligent life today. Thus, as the 20th century progressed, they looked further out. One of the great discoveries of the past 30 years is that not only are there planets around stars—something that wasn't known at the time of Charles Cros—but that virtually all stars have planets. And, in fact, the Kepler mission, launched by NASA more than a decade ago, showed that there are planets everywhere, and future ongoing missions have found that more and more stars have planets.

Even some of the stars nearest to Earth have planets around them, which means the possibility of finding life we could potentially communicate with. SETI started in 1960 with a search for radio signals from two nearby sun-like stars. This search used the kind of telescopes that astronomers use

to survey the sky and to understand the composition and structure of our galaxy and the evolution of stars. But they used that telescope in a different way: tuning it like a cosmic radio dial, hoping there's a radio station on that's transmitting a message our way, and that's very different from the kind of radio signals that stars and galaxies naturally emanate. They also send radio signals, but instead of being at one point on the radio dial, they're spread out over a range of frequencies. So, if astronomers find a signal that stands out as one point of the radio dial, that will be the telltale sign of an artificial signal that is the sort we're looking for.

Thus, Dr. Vakoch thinks that instead of just passively looking for extraterrestrial intelligence, we should be doing more and more messaging to it by sending powerful intentional signals in the hope of getting a response. He points out that one of the big questions is what language we should use if we aim to make contact with another civilization. Thus, the first step should be finding out the language we and they have in common. That requires us to think about what it is that we want to share with them. If we don't share a common natural language, what is it that we will share that could be the basis for a conversation?

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Dr. Vakoch thinks that radio technology plays a critical role for sending or receiving messages. Preparing messages which they might understand is another crucial step. He states that proceeding with something as basic as counting to develop a way of talking about our shared universe



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would help for this process and serve as the simplest common denominator. Thus, Dr. Vakoch underlines that today sending a series of pulses, as suggested by Cros, with the use of counting numbers in different versions and in more complicated pattern is used as the best method.

We can't lose sight of the fact that these aliens may be more advanced than us, or less advanced. The first scenario is preferable because they would be able to receive and understand our message.

Vakoch stresses that that each species evolves in its own distinctive environment and each science that develops has its own history. We are discovering facts about the universe as it exists, but we're describing that universe in ways that make sense to us. And a species, however intelligent or scientifically savvy it might be, that experience the world through different senses than we do, and have a very different ways to describe it. That is an important factor that we need to grapple with. How do we anticipate the unknown senses of life beyond Earth? Thus, that brings up the problem of if we want to figure out how to send a message that will be meaningful to a life form here on Earth.

In all of these cases, we need to try to anticipate what to say that would be understandable, which is very difficult because even different species on Earth use different senses. And one of the possibilities is that the aliens, even if they can see, may have such different ways of describing what they see, even when depicting the same physical object that we and they know about, that we may need to teach them.

Considering the fact that even here on Earth, there's so much built into cultural assumptions of how to show something as common and universal among humans as the shape of our body. This why the Voyager spacecraft had a single metal plaque attached to it that included a record album that had over 100 pictures of life on Earth. On one side included Greetings in Earth, and music from around the world on the other side. And for the pictures, there were some attempts to show the extraterrestrials how it is that we see.

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Dr. Vakoch argues that we human beings are very good at detecting patterns and making sense of the universe. And the challenge always is that if we do get a signal and we begin to interpret it, are we really interpreting the message in a way that it gets at the intent of those who sent it? Or is it more a reflection of what we hope for or what we're afraid of? So, is it more of a cosmic inkblot test that says more about us than about them? To be on guard, we need to be aware of our tendency to project meaning into the universe. And that holds true even at the most basic level, finding a signal that we think looks good—a little blip on the radio dial that is unlike anything that we've ever seen nature make. And we need to be patient and willing to confirm that and double test ourselves, because our tendency is to want to find life out there, and so we need to be doubly cautious about not assuming it's there unless we have very solid evidence.

So, what does it look like in practice to send a message to a civilization that may be very different from us? The transmitter that METI used was in northern Norway—north of the Arctic Circle—as part of a project conducted in conjunction with the Sonar Music Festival in Barcelona and the Catalonia Institute of Space Sciences. These organizations sent messages on three successive days as part of a plan to reach out to any civilizations that may be present at a nearby star. Tromsø, a city in northern Norway that is a popular place for scientists who want to understand the Northern Lights, now also hosts also the METI transmitter that sends radio signals to other worlds. Most of these signals go off into space while some bounce back to Earth, and that helps scientists understand the composition of the upper atmosphere.



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There are several ways to send message to the space. The ones sent from Tromso are different from the typical messages that have been sent out.

Even though the focus for the last 60 years has been on SETI, there have been some symbolic efforts to send messages, and the most famous message was sent from what was at the time the world's largest radio telescope in Arecibo, Puerto Rico. It was a message sent in a format very similar to the proposals we saw from Charles Cros: a binary code. In this case, the encapsulated scientific information starts with a counting system at the top, some basic chemistry as we go down, and then pointing ultimately to that a figure of a two human beings, a man and a woman, which is what most people recognize. But along the way, there's also a description of our solar system that's laid out underneath the human with the third planet nudged toward the human to show that's the planet we come from. To one side, it's the height of the human being.

The second difference is sending the message to a nearby star instead to a very distant one, such as when METI sent a signal to Luyten's star, which is 12 light years away. Thirdly, METI built into our transmission the sort of confirmation that scientists on another world will use if they're following the same guidelines our study scientists use. The transmitter in Tromso sent our message at three different times so that there is repetition. But then one day later we sent the same grouping, and then grouping another 48 hours later. That gives the aliens an opportunity to find mistakes or errors. That also gives them the opportunity to eliminate an error in the signals as they traverse these great distances. And it gives the aliens on another world some time to prepare, to observe again. So we built all of this into our message. It's not just a one-off transmission, like the Arecibo transmission, but something that repeats over time.

Next step would be what does the message mean in terms of what our relationship with them would be. That should be a difference between contact with an advanced civilization and a less advanced civilization which is similar when indigenous peoples of the Americas contacted first with European colonists. Thus, the messaging should take care of that process.

In sum, Dr. Vakoch explains that METI has been sending a message saying, "yes, we know that you know we're already here; what you don't know is that we want to make

contact and here's our opening, and we'd love to hear back from you." According to him, as we reflect on what strategy we should focus on, it's very understandable to think that in the early days of SETI, 60 years ago, we would focus on listening because we have been a civilization in our adolescence, and the very nature of SETI plays into those adolescent desires. He suggests that as we think of the next 60 years, we should also think about ways that we can grow up, not only what we can gain for ourselves, but what we can offer to another civilization.

About the Authors

Dr. Douglas Vakoch is the President of METI International, a nonprofit research and educational organization dedicated to innovative programs in Messaging Extraterrestrial Intelligence (METI), the Search for Extraterrestrial Intelligence (SETI), and astrobiology. Prior to founding METI International, for sixteen years Dr. Vakoch worked at the SETI Institute, where he was Director of Interstellar Message Composition.

He completed his BA in Religion at Carleton College, his MA in History and Philosophy of Science at University of Notre Dame, second MA in Psychology at State University of New York at Stony Brook, and his PhD in Clinical Psychology with Quantitative Minor at State University of New York at Stony Brook. He is the editor of a over twenty books, including "Communication with Extraterrestrial Intelligence" (2011), "Psychology of Space Exploration: Contemporary Research in Historical Perspective" (2011), "Astrobiology, History, and Society: Life Beyond Earth and the Impact of Discovery" (2013), "Archaeology, Anthropology, and Interstellar Communication" (2014), "Extraterrestrial Altruism: Evolution and Ethics in the Cosmos" (2014), and "The Drake Equation: Estimating the Prevalence of Extraterrestrial Life through the Ages" (2015).

Dr. Vakoch serves as founding editor of Springer's Space and Society series, as well as general editor of Lexington Books' Ecocritical Theory and Practice series. His work has been featured in such publications as the New York Times, Nature, Science, and Der Spiegel, and he has been interviewed on radio and television shows on the BBC, NPR, ABC, The Science Channel, The Discovery Channel, and many others.



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ABOUT THE PROJECT

Imagining A Common Horizon for Humanity and the Planet

The world is passing through an extremely troubled period in its history, with a seemingly new challenge encountered at every turn. Serious economic, social, cultural, environmental and political crises at a global level are exacerbated by those being felt in individual countries. The challenges we are facing take a variety of forms, from financial collapses to climate change, from international terrorism to regional conflicts, and from the refugee problem to xenophobia.

All of these crises are being aggravated by the impact of the pandemic, revealing the inability of humanity to tackle them collectively, and invalidating the romantic discourse of globalization. As history continues its march, we are reminded that the answer to the common problems of humanity cannot be found by becoming more introverted, polarized or prejudiced. No matter how severe our problems, our destiny should not be seen as unchangeable. The problems we experience are primarily a result of human activity, and can be overcome only through human effort, but we should remain aware that there are many different hurdles to be passed if we are to rid ourselves of the crises being experienced in many parts of the world.

Only through conscious, patient and collective effort can we overcome the problems of humanity. Now is the time for dignified people from the different cultures and geographies of the world to come together in solidarity. It is time to speak with full respect of human dignity, setting aside the importance we place in our individual identities. An alliance of people who see truth and justice as the major pillars of our kind, will be able to open the door to a new era of solidarity for humanity. A dignified future is possible. We believe that Turkey holds a special, if not privileged, position, based on its geographical, historical and cultural characteristics, and can serve as a host to this joint effort of humanity.

Our goal within the scope of this project is to bring together the leading thinkers of the world, to create an international intellectual platform that draws its strength from human dignity, and that aims to build for the future of humanity and the planet with a holistic synergy with a view to offering humanity a common horizon. As Cappadocia University, our vision in this regard is to provide an academic platform from where esteemed intellectuals from around the world can share their visions for a common future of humanity and our planet, and to comment on the challenges and opportunities they envisage.

You can find detailed information about the Project at <https://commonhorizon.kapadokya.edu.tr/en/>

Cappadocia University (<https://kapadokya.edu.tr/en/>) is a young foundation (private) university in central Turkey, Cappadocia. The main goal of the university is to raise generations of opinion leaders who can read the 21st century realistically, and whose views therefore carry weight and significance – go-to men and women who are highly knowledgeable in their fields, who are happy to share their knowledge, and who will thus be respected and trusted by others. Cappadocia University is home to a highly successful dual-pronged system of academic and vocational programs that act in support of each other.

ABOUT THE
CAPPADOCIA UNIVERSITY