

What To Do When Extraterrestrials Show Up?

By Avi Loeb on May 28, 2021

When you walk through the wilderness, you'd better be quiet and listen, because you never know whether there are predators out there. Unfortunately, we did not follow this cautionary measure so far, as we had been [broadcasting](#) radio waves into space for more than a century. And if there are technological civilizations within a hundred light-years that monitor their sky with radio telescopes similar to ours, then they may already know about us and we might hear from them. Our saving grace is that chemical rockets, similar to those used in the [Voyager](#) or [New Horizons](#) missions, will take a million years to traverse a hundred light years. And so, we might be out for a prolonged suspense before encountering our cosmic neighbors.

If extraterrestrials (ETs) arrive at our doorstep, the question is how to respond? Clearly, interstellar affairs are not an imminent policy concern for any nation at this moment, and there is no international protocol issued by the United Nations for a response.

How much advance warning will we have? That depends on the size of the vehicle used by the ETs. Even without generating artificial light, any alien spacecraft would reflect sunlight. The [Pan-STARRS](#) observatory in Hawaii can detect reflected sunlight from objects bigger than a football field, that pass within the orbit of the Earth around the Sun. The first interstellar visitor of such size was discovered by this telescope on October 19, 2017 and named ['Oumuamua](#) - a 'scout' in the Hawaiian language. The object showed many anomalous properties that made it different from any natural comet or asteroid that we had witnessed before in the Solar system, allowing for the possibility that was manufactured artificially by an alien technology - as discussed in my new book, [Extraterrestrial](#).

'Oumuamua had [a flattened shape](#) with extreme proportions—never seen before among comets or asteroids, as well as an unusual initial velocity and a shiny appearance. It also lacked a cometary tail, but nevertheless exhibited a push away from the sun in excess of the solar gravitational force. As a regular comet, 'Oumuamua would have had to lose about a tenth of its mass in order to experience the excess push by the rocket effect. Instead, 'Oumuamua showed no carbon-based molecules along its trail, nor jitter or change in its spin period—[as expected from cometary jets](#). The excess force [could be explained](#) if 'Oumuamua was pushed by the pressure of sunlight; that is, if it is an artificially-made lightsail—a thin relic of the [promising technology](#) for space exploration that was proposed as early as 1924 by [Friedrich Zander](#) and is currently being [developed](#) by our civilization. This possibility would imply that 'Oumuamua is a message in a bottle.

The many [anomalies](#) exhibited by 'Oumuamua forced all natural interpretations of it to invoke object types that we have never seen before—all with major drawbacks. They include the hypothesis that it's [a hydrogen iceberg](#)—but that would likely have [evaporated by absorbing starlight](#) during its journey; [a nitrogen iceberg](#) chipped off the surface of a

Pluto-like planets around other stars – but that [requires](#) much more raw material than available in the Milky Way; [a dust “bunny”](#) a hundred times more rarefied than air—but that might not have the material strength to withstand heating to hundreds of degrees by the sun; or [a tidal disruption relic](#)—which would not have the [pancake-like shape inferred](#) for ‘Oumuamua.

Even if ‘Oumuamua is an artificially-made ‘plastic bottle’ - distinct from all natural rocks in the Solar system, it is most likely equipment that is billions of years old and out of commission. Most stars formed [billions of years](#) before the Sun, and the technological relics that their civilizations launched to space are probably too old to be functional. We can retrieve more information about technological relics by taking [close-up photographs](#). It is often said that “a picture is worth a thousand words.” In my case, a picture is worth 66,000 words, the length of my book. The missing image could have distinguished between ‘Oumuamua being a natural rock or an artificial object manufactured by an extraterrestrial civilization.

Are we the [smartest kid on our cosmic block](#)? To find out, we should keep our eyes open. An intriguing photograph could motivate a follow-up mission of landing on the object and deciphering its purpose based on its composition. It would be particularly exciting to uncover a label stating “Made on Planet X” or to discover something like the [Golden Record](#) aboard the [Voyager 1 and 2 missions](#) that we sent out of the solar system.

Putting our hands on a piece of alien technology would change the way we perceive our place in the universe, our aspirations for space and our philosophical and theological beliefs. Copying an extraterrestrial technology that we do not possess could be a financial goldmine. Our psychological shock would resemble the one encountered by my daughters when they met smarter kids on their first day in the kindergarten. Until that day, my daughters thought that they are unique and there is nobody smarter than them.

Instead of searching we could choose to stay ignorant about our neighbors. This would be equivalent to my daughters choosing to stay at home. The possible existence of ETs will not go away if we ignore them, just like the Earth continued to move around the Sun after the philosophers refused to look through [Galileo](#)’s telescope.

Science relies on reproducibility of results. In order to believe evidence, it must be possible to reproduce it as an outcome of similar circumstances. Stories about one-time miracles are the foundation of myths and could be believed by the public, but they do not stand up to the standards of science. According to the biblical story of the [binding of Isaac](#), Abraham heard the voice of God asking him to sacrifice his only son. Today, with a voice memo app on his cell phone, Abraham could have recorded the voice of God and convinced all of humanity to believe in the reality of his experience. But without a recording device, a [hearsay evidence](#) is not scientifically sufficient.

The situation gets complicated with eyewitness testimonies of one-time events. The Pentagon [was asked](#) by lawmakers to disclose all it knows about Unidentified Aerial Phenomena (UAPs) by June 2021. But this focus on past eyewitness reports is misguided.

It would be prudent to progress forward with our finest instruments, rather than examine past reports. Instead of declassifying documents that reflect decades-old technologies used by witnesses with no scientific expertise, it would be far better to deploy state-of-the-art recording devices, such as camera or audio sensors, at the sites where the reports came from, and search for unusual signals.

A scientific expedition focused on reproducing old reports would be far more valuable in unraveling the mysteries behind them. Personally, I will be glad to lead scientific inquiry into the nature of these reports and advise Congress accordingly. This could take the form of a federally-designated committee or a privately funded expedition. Its most important purpose would be to inject scientific rigor and credibility into the discussion.

ABOUT THE AUTHOR



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Avi Loeb is a member of the American Academy of Arts and Sciences and was the longest-serving chair in the history of the astronomy department at Harvard University (2011-2020). He serves as the founding director of Harvard's Black Hole Initiative, the director of the Institute for Theory and Computation at the Harvard-Smithsonian Center for Astrophysics, and chairs and the advisory board for the Breakthrough Starshot project. Loeb is the former chair of the Board on Physics and Astronomy of the National Academies and a former member of the President's Council of Advisors on Science and Technology at the White House. He is the bestselling author of "[*Extraterrestrial: The First Sign of Intelligent Life Beyond Earth*](#)", published a few months ago by Houghton Mifflin Harcourt.