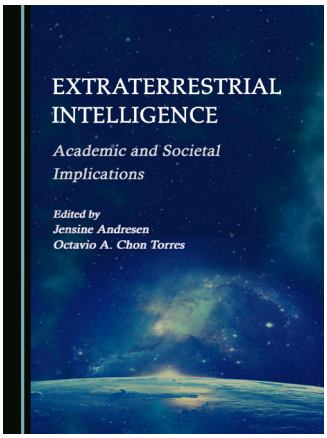
Journal of Scientific Exploration
Anomalistics and Frontier Science

BOOK REVIEW

Extraterrestrial Intelligence: Academic and Societal Implications (Eds). J. Andresen & O. Chon Torres

Jeremy J. Drake
Center for Astrophysics: Harvard & Smithsonian



Cambridge Scholars Publishing
ISBN13: 978-1-5275-7727-5

https://doi.org/10.31275/20222807

The impact on human society of new scientific discoveries is generally a quite gradual one, and more evolutionary than revolutionary. At least on the timescales that describe our everyday lives. New physics or chemistry or biotechnology takes industry some time to assimilate, and new products often take years to deploy. Today's top discoveries in astronomy have very little impact at all, perhaps piquing the interest of society's scientific bent for one or two news cycles, perhaps leading to revisions in a few paragraphs of the next editions of standard textbooks.

New behaviour observed from a black hole in a galaxy far, far away might be absolutely fascinating, but beyond those who find it so the rest of human society will continue along its merry way oblivious.

Could this be about to change? Thanks to NASA's *Kepler* and *Transiting Exoplanet Survey Satellite (TESS)* planet-finding missions, together with a slew of ground-based facilities, "exoplanets"—planets that orbit around stars other than the Sun—are now mainstream. At the time of writing, there were 5197 confirmed planets detected around other stars (NASA Exoplanet Archive), a number that is steadily increasing as the exoplanet surveys continue providing copious new data for astronomers to sift through and look for telltale planetary signatures.

Whether or not we are alone in the universe has been a smouldering question for humanity for centuries. The first exoplanets discovered in the mid-to-late 1990s fanned the embers into flame, and the explosion in discoveries from *Kepler* and *TESS* have poured gasoline on the fire: Naturally the question of whether any of these planets can host life arises. Most of them are not deemed "habitable"—they are either gas giants with no rocky surface, or are estimated to be either too hot or too cold for the presence of surface liquid water, a key ingredient for "life as we know it". But many are, and current estimates put the fraction of Sun-like stars with habitable planets at about 50%, give or take (Bryson, 2021, p. 36). That means about 4 potentially habitable planets around Sun-like stars within the nearest 30 light years, and two billion or so in the Milky Way galaxy.

The impact of the discovery of exoplanets on astrophysics cannot be overstated. In the last 25 years, the possibility of life on other planets has gone from an exercise of pure speculation in a vacuum of any observational constraints to being widely accepted and studied by the scientific community. A sizable fraction of astrophysics funding and new university and observatory faculty hires now go into searching for, characterizing, and modelling exoplanets. One of the primary science goals of the recently launched NASA flagship James Webb Space Telescope, and of the upcoming generation of 30 m class ground-based telescopes, is to examine nearby planets for signs of atmospheres and even "biosignatures"—the signature gases of photosynthesis, or other plausible metabolisms of life.

If life *is* common in the universe, the panoply of new instrumentation that will fo-

cus on exoplanets in the coming years means *we are likely to witness the discovery of biosignatures within our lifetimes*! Such a discovery would surely be one of the most important advances in knowledge in human history, and potentially revolutionary rather than evolutionary. There is a big difference between "life" and "intelligent life" of course, but the mere presence of "life" increases probability estimates for the latter enormously.

After many decades of discussion in the popular press and in the fringes of the scientific literature, Extraterrestrial Intelligence (ETI) and even the possible presence of alien intelligence here on Earth, must then also have become respectable, mainstream scientific topics? Well, not quite.

Figure 1. Sidewalk stencil seen in Harvard Square, Cambridge, Massachusetts.

During a recent stroll in Harvard Square, I came across a stenciled UFO with the phrase "They have landed . . . " on the sidewalk (Figure 1). Mainstream science is still not far from the viewpoint of this that it has had for the last 80 years or more.

But thanks to exoplanets that is changing. In the United States, the Search for Extraterrestrial Intelligence (SETI) has come out of the funding wilderness, into which US Congress banished it by cutting funding in the early 1990s (e.g., *The New York Times*, 1993), and into the limelight of modest renewed Federal Government support and substantial private funding. Detection or discovery of ETI would not only raise the stakes on "one of the most important advances in knowledge in human history" but would make a truly profound impact on human society. Not only from a scientific perspective, but also philosophically, theologically, and psychologically.

And so we come to *Extraterrestrial Intelligence: Academic and Societal Implications*, a book intended as an interdisciplinary look at ETI and the implications its discovery would herald. It comprises 300 or so pages of writings from some leading thinkers on ETI that run the gamut from astrophysicists to an expert in Eastern religion and philosophy, and a kitchen sink full of everything in between. The volume is divided into two parts, each consisting of nine chapters. The first part is slated as offering philosophical and scientific perspectives, and the second social science and interdisciplinary perspectives.

I learned a lot reading this book and enjoyed it enormously. Well, mostly. A couple of chapters did feel a bit like the reading equivalent of watching the psychedelic sequences toward the end of *2001: A Space Odyssey.* More on that later.

The first chapter, "Cartographies of knowledge and academic maps" by independent scholar and writer Jensine Andresen, sets us up for the discussion in the rest of the book. Andresen posits that it is the very organization of academia into its neatly siloed disciplines that is responsible for the failure of our species to educate ourselves to successfully address fundamental existential problems, like climate change, wars, sharing of resources, and . . . addressing *Unidentified Aerial Phenomena* (UAP). Appeals for a change in attitude of scientists in academia toward ETI are also sprinkled throughout the various writings in the book. Having attempted to navigate the route of interdisciplinary research myself, I found Dr. Andresen's comments on this especially spot-on. Her arguments against the rigidities of present-day education and research, characterized as essentially an institutionalized "stay in your lane", do make sense and many a scholar who has pondered the interdisciplinary route will also recognize this thinking.

Not surprisingly, UAP, and the *Fermi Paradox,* are recurring ETI themes throughout the different chapters. "UAP" is the rebirth of "UFO", a fresh acronym unsoiled by the, shall we say, unscientific baggage that the term UFO garnered over the years. The *Fermi Paradox* is the tension between the notion that ETI is common in the Universe and the lack of scientifically convincing evidence for it. It stems from an informal lunch conversation between Enrico Fermi, Edward Teller, Emil Konopinski, and Herb York at the Los Alamos National Laboratory circa 1950 about "flying saucers," in which Fermi asked the now celebrated question "Where are they?" (Jones, 1985). As this book attests, it is not an unreasonable question today! Indeed, in addition to Andresen, several of the authors lament the

fact that UAP are not studied by mainstream academia and they are of the clear opinion that UAP *are* evidence of the presence of ETI here on Earth. Fermi Paradox resolved?

This is where the volume perhaps misses half a beat. The fundamental reason UAP have *not* entered mainstream science is that the ETI explanation pretty much requires faster than light travel if life elsewhere is anything like the Earth's examples. Even though the Universe is now thought to consist mostly of "Dark Energy" and "Dark Matter," neither of which are presently understood and represent gaping holes in our theory, faster-than-light travel is not an accepted possibility in physics as it stands today. Special Relativity, Einstein's theory of the behaviour of matter in the absence of strong gravitational fields, shows how the mass of a particle becomes infinite as it nears the speed of light. The theory has been tested to exquisite precision and is a basis of the physics at work in particle accelerators routinely in use around the world. Dark Energy and Dark Matter scream in our face that our physics is grossly incomplete, but we do not get a blank slate to make up what we like, including faster-than-light travel. Under such restriction, UAP as evidence of ETI is not likely to tap into public sources of science funding or attract a groundswell of professional scientists to study it.

Several authors touch on other appeals outside of current physics that obviate superluminal travel, such as ETI existing on or utilizing higher dimensionalities. Humans, in a universe 13.7 billion years old, have been technologically savvy for only a century or so. The level of technology and the nature of ETI thousands, millions, or billions of years in advance of us would, in the words of Arthur C. Clarke, be indistinguishable from magic. Sentience and intelligence themselves also are difficult to define, as recent studies such as those into the possible sentience of fungi remind us (Support Psyche). We must be careful not to be drawn into the anthropomorphic trap: The form of ETI could be very different from ourselves, or even to life on Earth, such that thousands of years of travel at sub-light speed might not be so problematic after all.

In chapter two, "Communicating with an extraterrestrial intelligence," Eamonn Ansbro argues that UAP *are* manifestations of ETI, and that the former can inform how to communicate with the latter. Ansbro makes the interesting point that electromagnetic radiation might not be an effective means if ETI employs some form of superliminal technology. This all sounds plausible enough, but the foundation of Ansbro's arguments, and of others in this volume, is that UAP *do* behave in ways that defy a terrestrial origin explanation and therefore demonstrate that ETI is present on Earth. But the former assertion remains far from proven (David, 2021).

Astrophysicist Chris Impey takes up both sides in a delightfully written chapter three, "Why are we so lonely?" On the one hand, as Impey notes, in this era of exoplanet discovery most astronomers at this time probably do think that life exists elsewhere in the Universe—there are just too many planetary systems out there, to the tune of 10^{20}, or 100 billion billion in Impey's assessment. This does render the prospects of ETI somewhat more likely. On the other hand, he asks what have we truly learned about ETI if UAP are indeed their manifestation? His answer is essentially nothing, at least nothing of any real scientific value. And thus, Impey concludes that "Contact has not happened," and, with Fermi's "where are they?" question in our minds, that it is not inevitable "soon, or ever."

That rather gloomy take amidst the UAP exuberance of most of the rest of the volume is followed by two appeals to study UAP and ETI in new ways. The first is by one of the volume's editors, Octavio Chon Torres. The eminent Peter Sturrock, one of the founders of the Society for Scientific Exploraiton, has taught us that just about anything can be studied with the scientific method given an appropriate analysis formalism, and Chon Torres picks up a similar thread regarding the scientific study of UAP. UAP are generally not studied by professional scientists—for reasons noted earlier—but this does not have to be the case, including through direct observation or witness testimony. "An unidentified object remains unidentified, does not become something else and does not represent a challenge to the entire body of scientific knowledge." Chon Torres makes a tight and convincing case that Science can and should be applied seriously to UAP without prejudice.

A formidable piece, though slightly meandering and the longest in the book, is provided by Harvard professor Avi Loeb. Loeb is a colleague at the Center for Astrophysics, where I work; he is a remarkable scientist, and one I much admire. He has also become somewhat of a controversial figure in the astronomy community in recent years, some of whom feel he goes for the "It's aliens" explanations of phenomena rather too readily, and most notably in the 'Oumuamua case'—the first interstellar object detected passing through the Solar System. Loeb was one of the first to voice the idea that it could be an alien artifact, or perhaps even a spaceship, and he returns to the topic several times in this piece. Astronomers with strong opinions against this idea point to work such as the findings of the "'Oumuamua ISSI Team''.

Comprising a dozen or so experts in a wide range of fields relevant for unravelling the 'Oumuamua puzzle this group concluded "that in all cases the observations are

consistent with a purely natural origin for 'Oumuamua" ('Oumuamua ISSI Team, 2019). This is also far from saying that an ETI explanation is ruled out: It *could* be aliens, but the most likely explanation is that it is not. Loeb is of course aware of the evidence and exhorts the science community to keep an open mind, taking the bandwagon critics to task—I think justifiably.

Loeb's chapter is somewhat of a tour de force, ranging from the physics of black holes and the early Universe, all the way through to Breakthrough Starshot—a concept to send a tiny spacecraft with a camera to the Proxima Centuri planetary system—and his thoughts on how society needs to rethink education, research, and the search for ETI. But it also lacks some direction sometimes and needs a stern editorial pen and proofreading to remove some repetition. Loeb cites the many *Scientific American* articles he has written, which is probably fine for most readers, although I would also have liked to see more primary references to some of the ideas discussed.

How we might actually detect and study UAP more systematically is the topic of a contribution by Hakan Kayal, a professor of space technology. Kayal's chapter provides a good summary of UAP in general—see also Andresen's Chapter 18 for that—and he outlines a plausible approach to the problem he terms "HYPER-SETI", which is essentially a multi-wavelength image recording and analysis system. Getting more philosophical toward the end, he touches on what we might learn from a friendly ETI encounter: perhaps not only finally cracking that seemingly indestructible nut of how to unify Quantum Mechanics and General Relativity, but (and why not?) adding in the nature of consciousness to boot.

Physicist and industrialist Daniel Gross, not having been deterred by Chris Impey's writing, begins his chapter with the assertion "Humans have been contacted by advanced extraterrestrial intelligences." In a thought-provoking essay on how the evolution of intelligent biological life progresses, Gross introduces a generalised Copernican principle that he extends to life and its evolution, in which humans are not only nothing special in the Universe, but that universal life proceeds pretty much the same everywhere as it has on Earth. Such evolution to higher and higher intelligence likely does not proceed in a smooth, continually upward trajectory but is likely interrupted by periods of stagnation and even regressive societal collapse—a notion that hit home with the turbulent geopolitical times we find ourselves in looming in the background.

I am guessing that the authors of the individual chapters in *Extraterrestrial Intelligence* were given free rein to roam over whichever aspects of the subject they chose. Mostly this works out quite well, with little to raise eyebrows about, at least on the visage of someone who has picked up a book called *Extraterrestrial Intelligence*. The chapter "The impact of physical sciences on the study of UAP" by astrophysicist Massimo Teodorani did exercise my frontalis rather more, and a couple of times on both sides.

All begins smoothly, with a similar lament to that of Chon Torres that the scientific method *is* robust enough to study UAP, but UAP remains quasi-taboo in the scientific community. And Teodorani does do a service in pointing out that quantum entanglement *cannot* be used for faster-than-light communication, as is speculated more than once elsewhere in the volume. The piece then riffs on the theme of inorganic "plasma life," and idea that stems from computer simulations published in 2007 of dusty plasma behaviour by Vadim Tsytovich and colleagues (Tsytovich et al., 2007). In those simulations, helical plasma structures formed which under some circumstances could "replicate," leading the authors to draw a parallel with the DNA helix and conclude that "complex self-organized plasma structures exhibit all the necessary properties to qualify them as candidates for inorganic living matter that may exist in space".[1] For such a groundbreaking results, the absence of more extensive follow-up simulations is conspicuous; later laboratory experiments found the helical structure is just one of several that can form (Hyde et al., 2019). Drawing parallels between the helical structure in the plasma case with that of DNA to help the argument that the former is a type of life is surely spurious. Devilishly complicated plasma behaviour can still be understood through electric and magnetic fields, and gravity. Teodorani goes on to expound on several other fascinating ideas, but ones often somewhat speculative and too far removed from known physics for my eyebrows.

The second part of *Extraterrestrial Intelligence*, "Social Science and Interdisciplinary Perspectives," was a more challenging read for me. I did find some gems, but at times was reaching for the coffee. I also learned some new words that I will never remember, and a lot about the remarkable scientist and philosopher David Bohm, for which I was grateful.

One gem is the short piece by scientist, educator, and priest Michael Reiss on UAP and the search for knowledge. While it touches on now familiar themes—the Copernican principle, UAPs and the Academy, and the implications of Contact—it does so in a most accessible way with reference to science fiction film and literature. Observations on bioethics and theology also get the same delightful treatment.

In a brief cameo return, Octavio Chon Torres points out that any response to Contact with ETI must be peaceful since a likely enormous technology gap would render

us defenceless.

Fortunately, social scientist and philosopher Konrad Szocik takes stock from evolutionary biology and presents convincing arguments that any ETI in our midst must be positively inclined toward us, or at least neutral.

A piece by historian and theologian Glen Messer provides the best first-hand account of a UAP sighting in the book—described as a black cube moving in a straight line above the Hudson. It is nice writing and provides good context for a theological discussion of what the human attitude would and should be upon ETI contact. Buddhist scholar Ronald Nakasone argues that the "multi-centered vision of reality" in Buddhist doctrine is better suited to the challenges of contact with ETI than, for example, the Christian ideology of Catholicism.

'"Thought provoking" describes many of the chapters and for me is the strength of the volume—the feeling when confronted with so many fresh perspectives and lines of thinking that I had never considered was truly gratifying. The essay by physicist, chemist, and entrepreneur Carl Peterson with the lengthy title "Relativity and quantum theory: The manifestation of UAP and a new order for physics" had me scouring the web for more information on the work of David Bohm. Bohm also features, together with a lot of other good stuff, in "Will extraterrestrial consciousness remap the human mind?" by scientist and theologist Ted Peters. He describes his essay as an attempt to "put up street signs written in loopy cancelleresca directing us beyond the phenomenology of UAP to a holistic yet still scientific explanation." Cancelleresca can sometimes be a bit tricky to read, and I did lose the way a couple of times. But, as they say, it's the journey that counts, and Peters makes it a fun ride.

The chapter "The time model of contact and eastern authenticity testing" by philosophy PhD candidate Olena Kalantarova presented very intriguing ideas but it was less accessible to me—a reflection of my lack of education in eastern philosophy rather than of the essay itself; I did feel that I would enjoy a "for Dummies" version. An impressive and remarkable concluding essay, "Mind of the matter, matter of the mind," by Jensine Andresen also strayed into territory beyond my limited horizons. But, gosh, I also found it fascinating and exceedingly well-written. A well-researched assay of UAP from a US Government perspective flows into Bohm-inspired thinking on the nature of ETI and interpretations of reported UAP behaviour. Some of those did exercise the eyebrows, but never to exhaustion.

What is there not to like about *Extraterrestrial Intelligence*? There is a lot of repetition of facts, ideas, and concepts between chapters and no attempt to cross-reference the different contributions—the book is essentially a collection of independent essays with each of the authors evidently unaware of what is in the other chapters. This is fine for picking up the book and going for a quick delve into a chapter, but the binge reader might find the nth description of the Copernican Principle slightly tiresome.

It is not entirely clear what the target audience for the book is. Chapters have a range of entry levels, from Impey's writing that any interested layperson would enjoy, to Kalantarova's that has excursions into specialist territory. My privileged view from the astrophysics trenches gave me a leg-up on some of the more physicsy discussions that included references to quantum mechanics or relativity that readers without physics or science backgrounds might miss.

Some of the writers are of the firm conviction that UAP *are* evidence that ETI is among us and discourse extrapolates from that, I think sometimes further than the data warrant. It was always interesting, but I found some ideas overly speculative and had to suspend mental scientific critique on occasion. The eyebrows again.

So, should you buy *Extraterrestrial Intelligence*? If you are a *JSE* reader interested in the UFO phenomenon, yes, absolutely. If you are an open-minded ETI skeptic it will make you think from new perspectives. If you think ETI is among us, the ideas here are fascinating. Firm evidence of ETI *will* change the world and it is time we looked into this, seriously. Regardless of speed-of-light limitations in contemporary physics, taken as a whole, *Extraterrestrial Intelligence* makes a cogent case for the serious study of ETI and UAP in mainstream science. Its negatives are minor and the thinking is rich.

NOTE

[1]This raises the old idea that if a computer simulation produces behaviour indistinguishable from life, then is the simulation itself also life?!

REFERENCES

Bryson, S., et al. (2021). *The Astronomical Journal, 161.*

David, L. (2021, June 8). Experts weigh in on Pentagon UFO report. *Scientific American.* https://www.scientificamerican.com/article/experts-weigh-in-on-pentagon-ufo-report/.

Hyde, T. W., Kong, J. K., & Matthews, L. S. (2019). Physics Review E, 87, 053106.

Jones, E. M. (1985). Los Alamos LA-10311-MS, UC-34B.

NASA Exoplanet Archive. https://exoplanetarchive.ipac.caltech.edu/.

The New York Times. (1993, October 7). Section B, p. 12.

Oumuamua ISSI Team. (2019). *Nature Astronomy, 3,* 594. https://doi.org/10.1038/s41550-019-0816-x.

Support Psyche. https://psyche.co/ideas/the-fungal-mind-on-the-evidence-for-mushroom-intelligence.

Tsytovich, V. N., Morfill, G. E., Fortov, V. E., Gusein-Zade, N. G., Klumov, B. A., & Vladimirovet, S. V., et al. (2007). *New Journal of Physics, 9,* 263. https://doi.org/10.1088/1367-2630/9/8/263.