

Unidentified

Are UFOs and UAPs Ordinary, Extraordinary Terrestrial, or Extraordinary Extraterrestrial Phenomena?

BY MICHAEL SHERMER

AN ADVANTAGE OF HAVING WORKED IN THE SKEPTICAL business for 30 years is *institutional memory* that enables me to place the current claims and controversies into historical context, even that of personal memory. So, when the *New York Times* published their article on “The Pentagon’s Mysterious U.F.O. Program” in December of 2017,¹ and CBS’s *60 Minutes* reported that “UFOs Regularly Spotted in Restricted U.S. Airspace” in May of 2021²—the reports bracketing the latest wave of apparent sightings—I forthwith recalled similar such waves in the past, both since the early 1990s when we started publishing *SKEPTIC* magazine and devoting numerous issues to the topic,³ and previous historical upsurges of sightings going all the way back to the 1890s groundswell of “mystery airships” spotted moving across the United States, later identified as dirigibles. Historian Mike Dash’s description of the 1896-1897 series of these mysterious airships will sound familiar to those energized by the latest round of UFO videos:

Not only were [the mystery airships] bigger, faster and more robust than anything then produced by the aviators of the world; they seemed to be able to fly enormous distances, and some were equipped with giant wings.... The files of almost 1,500 newspapers from across the United States have been combed for reports, an astonishing feat of research. The general conclusion of investigators was that a considerable number of the simpler sightings were misidentification of planets and stars, and a large number of the more complex the result of hoaxes and practical jokes. A small residuum remains perplexing.⁴

Residues and Distortions

The final “small residuum” qualification hints at a reality in all skeptical and scientific investigations. No hypothesis or theory in any field accounts for 100 percent of the phenomena under investigation. The “residue problem” means that no matter how comprehensive a theory is there will always be a residue of anomalies for which it cannot account. The most famous case in the history of science is that Newton’s

gravitational theory could not account for the precession of the planet Mercury’s orbit, subsequently explained by Einstein’s general theory of relativity. Darwin’s theory of evolution by means of natural selection could not account for anomalies like the peacock’s large and colorful tail (which would be a bullseye for predators), but his theory of sexual selection did, demonstrating how females select for mates based on certain traits males develop to stand out from other males and to attract females.

The residue problem in UFOlogy is instructive because it enables skeptics to find common ground with believers and allows us to live comfortably with the fact that we can’t explain everything. For example, in her bestselling 2010 book *UFOs: Generals, Pilots and Government Officials Go on the Record*, UFOlogist Leslie Kean notes that “roughly 90 to 95 percent of UFO sightings can be explained” as:

weather balloons, flares, sky lanterns, planes flying in formation, secret military aircraft, birds reflecting the sun, planes reflecting the sun, blimps, helicopters, the planets Venus or Mars, meteors or meteorites, space junk, satellites, swamp gas, spinning eddies, sundogs, ball lightning, ice crystals, reflected light off clouds, lights on the ground or lights reflected on a cockpit window, temperature inversions, hole-punch clouds, and the list goes on!⁵

So the entire extraterrestrial hypothesis for explaining Unidentified Flying Objects and Unidentified Aerial Phenomena (UFOs and UAPs respectively) is based on a residue of data left over after the above list has been exhausted. What’s left? Not much, I’m afraid. Let me close the book on Kean’s book, since she was the co-author of that 2017 *New York Times* article that launched the current frenzy over UFOs and UAPs.

Kean begins by asking readers to consider “with an open and truly skeptical mind” that such sightings represent “a solid, physical phenomenon that appears to be under intelligent control and is capable of speeds, maneuverability, and luminosity beyond current known technology,” that the “U.S.

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government routinely ignores UFOs and, when pressed, issues false explanations,” and that the “hypothesis that UFOs are of extraterrestrial or interdimensional origin is a rational one and must be taken into account, given the data we have.” She then opens her exploration “on very solid ground, with a Major General’s firsthand chronicle of one of the most vivid and well-documented UFO cases ever”—the UFO wave over Belgium in 1989-1990. Here is Belgian Major General Wilfried De Brouwer’s account of the first night of sightings:

Hundreds of people saw a majestic triangular craft with a span of approximately a hundred and twenty feet and powerful beaming spotlights, moving very slowly without making any significant noise but, in several cases, accelerating to very high speeds.

Compare De Brouwer’s version of events to Kean’s summary of the same incident:

Common sense tells us that if a government had developed huge craft that can hover motionless only a few hundred feet up, and then speed off in the blink of an eye—all without making a sound—such technology would have revolutionized both air travel and modern warfare, and probably physics as well.

Note how de Brouwer’s 120-foot craft becomes “huge” in Kean’s retelling, how “moving very slowly” was changed to “can hover motionless,” how “without making any significant noise” shifted to “without making a sound,” and how “accelerating to very high speeds” was transformed into “speed off in the blink of an eye.” This language transmutation is common in UFO narratives, making it harder for scientists and skeptics to provide natural explanations. Keep this in mind as we consider the latest wave of UAP sightings and videos.

What Does “Real” Mean?

When UFO enthusiasts breathlessly announce that this current surge of sightings was confirmed as “real” by no less an authority than the *New York Times*, the assumption is that the “paper of record” launched an investigation of its own, independent of UFOlogists. That is not what happened. If you check the byline for that and additional articles in that paper, one of the coauthors is none other than Leslie Kean, who as we have seen is anything but a neutral and objective narrator of the UFO phenomena and the government’s response to it. (Kean has since moved on to write a new book and produce a Netflix documentary series called *Surviving Death*, on near-death experiences and the afterlife.⁶) Al-

though co-author Helene Cooper does work for the *New York Times* as a correspondent for Pentagon matters, the other co-author, Ralph Blumenthal left the paper in 2009 and wrote a book titled *The Believer: Alien Encounters, Hard Science, and the Passion of John Mack*, about the late Harvard psychiatrist who uncritically accepted alien abduction stories as accounts of real close encounters of the fourth kind.⁷

This context matters because the word “real”, quoted in nearly all media stories since that 2017 *New York Times* piece, is doing a lot of work here. For example, when *60 Minutes*’ correspondent Bill Whitaker asked Lue Elizondo, who directed the Pentagon’s Advanced Aerospace Threat Identification Program (AATIP), “So what you are telling me is that UFOs, unidentified flying objects, are real?” To which, Elizondo replied: “The government has already stated for the record that they’re real. I’m not telling you that. The United States government is telling you that.”⁸ But no one—not the media, not the military, and certainly not the United States government—is saying that these sightings represent alien visitors. What they are confirming as “real” is the videos themselves as representing something out there in the world, and not a hoaxed CGI production. But when both believers and the general public hear the word “real” their brains tend to autocorrect to “alien” (or “Russian or Chinese assets” if they’re exhibiting a modicum of skepticism), instead of an ordinary effect of cameras and visual illusions or, simply, an unexplained anomaly. Let’s look at the three hypotheses on offer for these UFO/UAP videos: (1) *ordinary terrestrial* (camera/lens effects, visual illusions, balloons, etc.), (2) *extraordinary terrestrial* (Russian or Chinese spy planes or drones capable of feats of physics and aerodynamics unheard of in the U.S.), and (3) *extraordinary extraterrestrial* (alien intelligence).

The Ordinary Terrestrial Hypothesis

The first video in this latest UFO/UAP wave was that of Lt. Cmdr. Alex Dietrich, who reported seeing an unidentified aircraft near San Diego in 2004. Her explanation of what she thinks she saw is prescient of what is likely to come in the report by the Pentagon to be published in the summer of 2021: “Just because I’m saying that we saw this unusual thing in 2004 I am in no way implying that it was extraterrestrial or alien technology or anything like that.” She added, “I think that the report’s going to be a huge letdown. I don’t think that it’s going to reveal any fantastic new insight.”⁹



Figure 1—
FLIR1 image.

The three most widely viewed and discussed videos were filmed by infrared cameras mounted on Navy F/A-18 jets over the Atlantic seaboard and off the coast of Southern California. They were taken by the Navy Advanced Targeting Forward Looking Infrared, or ATFLIR, camera pods attached to the fuselage of the jets, and they are now known as “FLIR1” (San Diego in 2004) and “GIMBAL” and “Go Fast” (Florida coast in 2015).

FLIR1 is Dietrich’s video from 2004 (Figure 1). According to *Popular Mechanics*, it first came to light in 2007 on a UFO website.¹⁰ It landed in public consciousness when it was reposted by the *New York Times* in Leslie Kean’s original article, then reposted in 2019 by the former Blink-182 front man guitarist Tom DeLonge’s UFO organization “To the Stars Academy of Arts and Science.”¹¹ In response, the Navy acknowledged that the videos were “real,” meaning that they are authentic videos and not hoaxes.¹² Finally, in 2020 the Pentagon re-re-posted the three videos “in order to clear up any misconceptions by the public on whether or not the footage that has been circulating was real, or whether or not there is more to the videos.”¹³ So, when people talk about these “new” videos, they are evidently anything but.

The heavy lifting on analyzing these videos from the skeptical community has been conducted by Mick West, a former video game designer, host of the *Metabunk.org* website and *Tales from the Rabbit Hole* podcast, and a columnist for *SKEPTIC* magazine.¹⁴ It is a remarkable body of work and one hopes the Pentagon’s work is of similar standard,

or that its analysts at least consider West’s explanations as part of their own investigations.

FLIR1 and GIMBAL (Figure 2), says West, are what one would see if a jet were flying away from the camera, thus accounting for the eyewitness accounts that the object showed no directional control surfaces or exhaust. And their apparent saucer-like and “Tic-Tac” shape, West continues, are due to glare on the lens of the camera. As he told the *San Diego Union-Tribune* reporter Andrew Dyer, “What we’re seeing in the distance is essentially just the glare of a hot object,” most likely that “of an engine—maybe a pair of engines with an F/A-18—something like that.”¹⁵

In the FLIR1 video the object appears to zoom almost instantly off the screen, interpreted by some to indicate extraordinary speed and turning ability far beyond anything our jets are capable of. Astonishingly, West appears to be the only person among the millions who have viewed these videos to have noticed in the upper left of the screen the camera “zoom” indicator double from 1 to 2 at the moment the objects zooms to the left. When West slowed down the video replay by half at that moment, the extraordinary maneuver becomes quite ordinary. In addition, West notes, sudden movements of the cameras can make the objects look like they are themselves making extraordinary maneuvers: “The supposed impossible accelerations in the ‘Tic-Tac’ video were revealed to coincide with (and hence caused by) sudden movements of the camera, leading to the conclusion that the object in the video was not actually doing anything special.”¹⁶

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The “Go Fast” video (Figure 3) purportedly shows an object with no heat source (and therefore propelled by some unconventional engine) that appears to move impossibly fast just above the surface of the ocean. West then conducted what he describes as “10th-grade trigonometry” (based on the numbers provided in the video image itself) to show that, in fact, the object was actually well above the ocean surface at around 13,000 feet and was probably just a weather balloon traveling at about 30-40 knots.¹⁷ “Because of the extreme zoom and because the camera is locked onto this object...the motion of the ocean in this video is actually exactly the same as the motion of the jet plane itself. You’re seeing something that’s actually hardly moving at all and all of the apparent motion is the parallax effect from the jet flying by.”

The most talked about video is “GIMBAL,” an object that appears to skim effortlessly over background clouds then come to an abrupt stop and rotate in midair, apparently without the propulsion systems necessary to pull off such a maneuver. Again, astoundingly, West appears to be the only person to notice that when the GIMBAL object rotates, background patches of light in the scene also rotate in perfect union with the object. “I think what’s clear about GIMBAL is it’s very hot—it’s consistent with two jet engines next to each other and the glare of these engines gets a lot bigger than the actual aircraft itself so it gets obscured by it,” West explains. “At the start of the video, it looks like the object is moving rapidly to the left because of the parallax effect, and the rotation was a camera artifact, and that the ‘flying saucer’ was simply the infrared glare from the engines of a distant aircraft that was flying away.”¹⁸ When he looked up the patents for that camera West found that the gimbal mechanism was responsible for the apparent rotation.¹⁹

Since these three UAP videos were re-re-re-posted by the Pentagon in 2020, two more videos by the UAP Task Force have been released. One shows a flying triangle (Figure 4) and the second an apparently zig zagging submersible sphere (Figure 5). West noted that the triangle UAP was filmed at night beneath the flight path into LAX, and that the object blinked in perfect unison with that of commercial airliners flying into Los Angeles from Hawaii. The triangular shape, he surmised, was most likely the result of a triangular shaped lens aperture, slightly blurred, producing a slightly blurred “bokeh” effect, or the soft out-of-focus background generated by photographing a subject with a fast lens and wide aperture.²⁰



Figure 2—GIMBAL image.



Figure 3—Go Fast image.



Figure 4—Triangle image.



Figure 5—Sphere image



Figure 6—First balloon image



Figure 7—Second balloon image

In fact, there were other triangle shaped objects in the image that correspond perfectly to celestial objects that West identified as the planet Jupiter and some known stars.

As for the “zig zagging” spherical object, also filmed off the coast of California from the combat ship Omaha, as you can see in West’s video analysis, it is the camera that is zig zagging, not the object, and it doesn’t “submerge” into the water, it simply disappears beyond the horizon.²¹ And, as you can see, it is in keeping with the historically common UFO collection of grainy photographs and blurry videos.

As well, here are two of the images from the 60 Minutes episode, eagerly presented the next day on Tucker Carlson’s Fox News show as yet another unexplained UAP (Figures 6 and 7). If you saw these images—say at a beach or a park or looking out the window of a plane—and you weren’t thinking of UAPs and UFOs, what would be your best guess as to what they were? Mylar balloons, right? That’s what I see anyway. In any case, that images like these are included in a serious media story as supposedly unidentified, gives one pause.

The Extraordinary Terrestrial Hypothesis

The first alternative to ordinary explanations for the UAP sightings is that they represent Russian or Chinese assets, drones, spy planes, or some related but as yet unknown (to us) technology capable of speeds and turns that seem to defy all currently accepted physics and aerodynamics. Pilots and observers describe “multiple anomalous aerial vehicles” accelerating from 80,000 feet down to sea level in seconds, or making instantaneous turns and even sudden stops, or shooting off horizontally at hypersonic speed, breaking the sound barrier without making a sonic boom, which should be impossible. Not to mention that such rapid accelerations and turns would kill the pilots instantly. Further, these vehicles appear to be able to do so with no apparent jet engine or visible exhaust plume, suggesting that they’re using some sort of antigravity technology unavailable to even the most advanced experimental programs worked on at DARPA.

When 60 Minutes’ correspondent Bill Whitaker asked former Navy pilot Lieutenant Ryan Graves, who had seen with his own eyes UAPs buzzing around Virginia Beach in 2014, “Could it be Russian or Chinese technology?” Graves responded, “I don’t see why not,” adding that “If these were tactical jets from another country that were hangin’ out up there, it would be a massive issue.”²² Indeed, as Top Gun navy pilot and commander of the F/A-18F squadron on the USS

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Nimitz, David Fravor, told *60 Minutes*, “I don’t know who’s building it, who’s got the technology, who’s got the brains. But there’s, there’s something out there that was better than our airplane.”²³

This hypothesis that the objects are terrestrial and developed by some other nation or corporation, or some genius working in isolation, is not a feasible one given what we know about the evolution of technological innovation, which is cumulative from the past. In his seminal work *The Evolution of Technology*, the historian George Basalla busts the myth of the inventor working in isolation, dreaming up new and innovative technologies out of sheer creative genius (the ping of the light bulb flashing brilliantly in the mind). All technologies, Basalla demonstrates, are developed out of either pre-existing artifacts (artificial objects) or already existing naturfacts (organic objects): “Any new thing that appears in the made world is based on some object already in existence.”²⁴

In his 2020 book, *How Innovation Works*,²⁵ Matt Ridley demonstrates through numerous examples that innovation is an incremental, bottom-up, fortuitous process that happens as a direct result of the human habit of exchange, and that it “is always a collective, collaborative phenomenon, not a matter of lonely genius. It is gradual, serendipitous, recombinant, inexorable, contagious, experimental and unpredictable.” Examples of such cumulative and incremental technological and scientific innovation include steam engines, jet engines, search engines, airships, vaping, vaccines, antibiotics, turbines, propellers, fertilizer, computers, farming, fire, genetic engineering, gene editing, container shipping, railways, cars, wheeled suitcases, mobile phones, corrugated iron, powered flight, toilets, vacuum cleaners, the telegraph, radio, social media, block chain, artificial intelligence, and hyperloop tubes.

It is simply not possible that some nation, corporation, or lone individual—no matter how smart and creative—could have invented and innovated new physics and aerodynamics to create an aircraft of any sort that could be, essentially, centuries ahead of all known present technologies. It would be as if the U.S. were using rotary phones while the Russians or Chinese had smart phones, or we were flying biplanes while they were flying F-18 fighter jets and Stealth bombers, or we were sending letters and memos via Fax machine while they were emailing massive files via the Internet, or we were still experimenting with captured German V-2 rockets while they were testing SpaceX level rocketry. Impossible. We would know about all the steps

leading to such technological wizardry.

Consider the Manhattan Project, arguably the most secretive program in U.S. history to date, which led to the successful development of atomic bombs in 1945. The Russians had an atomic bomb by 1949. How? They stole our plans through a German theoretical physicist and atomic spy named Klaus Fuchs. Modern tech companies like Apple, Google, Intel, and Microsoft are notoriously secretive about their inventions, enforcing extensive security protocols for their offices, and protecting intellectual property rights through patents and lawsuits. And yet...all of our computers, smart phones, computer chips, and software programs are essentially the same, or at least in close parallel development. Countries and companies steal, copy, back engineer, and innovate each other’s ideas and technologies, leaving no single entity very far ahead or behind any other.

In an unintentionally revealing quote in Kean et al’s 2017 *New York Times* article, Harold Puthoff, an engineer and believer in ESP and who worked for the CIA in its remote viewing program, said of these UAP objects: “We’re sort of in the position of what would happen if you gave Leonardo da Vinci a garage-door opener. First of all, he’d try to figure out what is this plastic stuff. He wouldn’t know anything about the electromagnetic signals involved or its function.”²⁶ How would a 15th century artist come into possession of a 21st century technology like a garage door opener? He wouldn’t because of the countless steps in technological development that would have to unfold over centuries to get to that innovation.

The Extraordinary Extraterrestrial Hypothesis

Could these UAPs and UFOs represent visitations by extraterrestrial intelligences (ETIs)? This is also highly unlikely for a number of reasons. But let’s first separate two questions that most people confuse: (1) Are ETIs out there somewhere in the cosmos? (2) Have ETIs come here? When I express my skepticism about the latter, people assume I’m also skeptical about the former. “Do you seriously think we’re alone in this vast cosmos?” is a common rejoinder I hear when I say something like “UFOs are not ETIs.” So let me state for the record that although we have no definitive evidence to answer either question in the affirmative I think it highly likely that they are out there somewhere but have not come here. There’s a lot to unpack here that goes a long way to explaining why these UAPs very probably are not ETIs.

To the first question—are they out there somewhere?—the law of large numbers suggests that they probably are. A 2016 analysis of the Hubble Ultra Deep Field by NASA and the European Space Agency estimated that there are at least one trillion galaxies in the universe.²⁷ Each of these galaxies has at least a hundred billion stars, which makes a total of a hundred million trillion stars in the universe—an almost inconceivably large number made even more staggeringly incomprehensible when written out: 100,000,000,000,000,000,000,000. When we factor in the Kepler Space Telescope’s discovery that nearly all stars have planets, this adds many more zeros to that already Brobdingnagian number. We also now know that it takes only a few million years for stars and planets to coalesce out of clouds of dust and gas to form solar systems. In our galaxy alone this happens about once a month. In the universe with the above number of stars, this would mean that a thousand new solar systems are born every second. In her book *Cosmos: Possible Worlds* (the companion to the television series hosted by Neil deGrasse Tyson), Ann Druyan captured the concept poignantly:

Snap your fingers. That’s a *thousand new solar systems* right there. Snap. A thousand new solar systems... Snap. A *thousand new solar systems*... Snap. A *thousand new solar systems*... Snap. Snap. Snap.²⁸

How many of these stars have Earth-like planets orbiting their sun-like star in a habitable zone conducive to the evolution of intelligent life with which we might communicate? This number is usually calculated using the eponymous Drake equation, proposed in 1961 by the radio astronomer Frank Drake for estimating the number of technological civilizations that reside in our galaxy:

$$N = R f_p n_e f_l f_i f_c L$$

Here, N = the number of communicative civilizations, R = the rate of formation of suitable stars, f_p = the fraction of those stars with planets, n_e = the number of earth-like planets per solar system, f_l = the fraction of planets with life, f_i = the fraction of planets with intelligent life, f_c = the fraction of planets with communicating technology, L = the lifetime of communicating civilizations.²⁹ In the Search for Extraterrestrial Intelligence (SETI) literature, a conservative 10 percent figure is often used for the different factors in the equation, where in a galaxy of 100 billion stars there will be 10 billion sun-like stars, one billion earth-like planets, 100 million planets with life, 10 million planets with intelligent

life, and one million planets with intelligent life capable of radio technology. A delimiting factor may be L , depending on how long civilizations last.

In reviewing the scientific literature for my August 2002 column in *Scientific American* on why ET hasn’t called, I found an estimated range for L from 50,000 years to 10 million years, which would result in the number of ETIs in our galaxy alone ranging from 4,000 to one million (depending on the numbers plugged into the other components of the Drake equation). Then using the history of civilizations on Earth, I compiled the lengths of 60 civilizations (the number of years from inception to collapse), including: Sumeria, Mesopotamia, Babylonia, the eight dynasties of Egypt, the six civilizations of Greece, the Roman Republic and Empire, and others in the ancient world, plus various civilizations since the fall of Rome, including the nine dynasties (and two Republics) of China, four in Africa, three in India, two in Japan, six in Central and South America, and six modern states of Europe and America. For all 60 civilizations in my database, there was a total of 25,234 years, or $L = 420.5$ years.³⁰

Plugging these figures into the Drake equation goes a long way toward explaining why ETIs have yet to come here. Where $L = 420.5$ years, $N = 3.35$ civilizations in our galaxy. Given the enormous size of our galaxy (100,000 light years in length and 50,000 light years in width) and the vast distances between the stars, if there were only a few intelligent and communicating civilizations the probability of them making contact with one another is astronomically low. Just how vast and empty is space? If our star were the size of an orange and it were in Los Angeles, the nearest star would be an orange in Chicago 2,000 miles away. In about four billion years the Andromeda galaxy will collide with our own, but in fact the stars are so far apart from one another that astronomers estimate that it is conceivable there will be no stellar collisions. A final example: the speed of our most distant spacecraft, *Voyager I*, is 38,578 miles per hour. If it were heading to the Alpha Centauri star system, (which it isn’t) the closest one to our sun at 4.3 light years away, it would take *Voyager I* 74,912 years to get to there.

If there are ETIs in our galaxy the chances of them finding Earth and visiting us even once is staggeringly low, let alone buzzing our airspace on a daily basis. Thus, the UAP = ETI hypothesis is extremely unlikely to be true.

**Bayesian Reasoning About UFOs,
or Why Extraordinary Claims
Require Extraordinary Evidence**

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How should we evaluate the likelihood of any of these three hypotheses—ordinary terrestrial, extraordinary terrestrial, extraordinary extraterrestrial? Let's start by applying the principle of proportional evidence, articulated in the 18th century by the Scottish philosopher David Hume in his 1748 *An Enquiry Concerning Human Understanding*: "A wise man proportions his belief to the evidence." The common expression for this principle is *extraordinary claims require extraordinary evidence*, or ECREE, popularized by Carl Sagan in his 1980 television series *Cosmos*, during the episode on the possibility of extraterrestrial intelligence existing somewhere in the galaxy, or aliens having visited Earth. ECREE means that an ordinary claim requires only ordinary evidence, but an extraordinary claim requires extraordinary evidence. The claim that ETIs have visited Earth is not just extraordinary; there is general agreement among both UFOlogists and SETI scientists that it would be one of the most extraordinary discoveries in the history of humanity.

UFOlogists claim that extraordinary evidence exists in the form of tens of thousands of UFO sightings. But SETI scientist Seth Shostak points out that this fact actually argues *against* UFOs being ETIs, because to date not *one* of these tens of thousands of sightings has materialized into concrete evidence that UFO sightings equal ETI contact.³¹ Lacking physical evidence or sharp and clear photographs and videos, *more* sightings equals *less* certainty because with so many unidentified objects purportedly zipping around our airspace we surely should have captured one by now, and we haven't. And where are all the high-definition photographs and videos captured by passengers on commercial airliners? The aforementioned Navy pilot Ryan Graves told *60 Minutes*' correspondent Bill Whitaker that they had seen UAPs "every day for at least a couple of years." If true, given that nearly every passenger has a smart phone with a high-definition camera, there should be thousands of clear high resolution photographs and videos of these UAPs. To date there is not one. Here, *the absence of evidence is evidence of absence*.

The ECREE principle is itself a specific form of Bayesian reasoning, invented in the 18th century by the Reverend Thomas Bayes. Roughly speaking, Bayesian reasoning has to do with the strength of evidence for a claim, and the reasoning rule has to do with how much we should revise our estimation of the probability of a claim being true based on the evidence. When the evidence changes we should

change our probability estimates accordingly. These estimations of probabilities based on prior knowledge of conditions related to the claim are called "priors"; or our initial degree of belief. The probability of something being true determines what is called the "credence" of belief, or the credibility or strength of the belief. Think of credence as the probability of something being true as a percentage. For example, you should believe with 50 percent credence that a fair coin toss will land heads based on your priors that flipped coins land 50/50 heads/tails. Or, if a bag contains four red marbles and one blue marble, and you withdraw one marble at random, then you should believe with 80 percent credence that the random marble will be red.

To put it a slightly different way in this context, an extraordinary claim—for example, that UFOs = ETIs—has a low Bayesian prior because of the poor quality of the evidence for it, and thus the credence for the hypothesis that UAPs = ETIs remains low unless better evidence emerges. Until then, we should have a lower credence in the claim of being visited by ETIs. The same Bayesian reasoning applies to UAPs as Russian or Chinese assets. Given what we know about the evolution of technological innovation—that it is gradual, recombinant, contagious, collaborative, and cumulative—no nation or corporate entity can have built drones or aircraft with such extraordinary physics and aerodynamics without us knowing about it. So, again, lacking extraordinary evidence in the form of an actual captured object, our credence that these UAPs represent extraordinary terrestrial craft remains low.

That leaves us with ordinary explanations for these phenomena. No matter how skeptical you may be of them, they are vastly more likely than either of the extraordinary hypotheses. Why, then, do so many people want to believe that they represent something more? I will conclude this analysis by turning to psychology, religion, and the desire to believe we are not alone.

Sky Gods for Skeptics

In his 1982 book *The Plurality of Worlds*, the historian of science Steven Dick suggested that when Newton's mechanical universe replaced the medieval spiritual world it left a lifeless void that was filled with the modern search for ETI.³² In his 1995 book *Are We Alone?* the physicist Paul Davies wondered: "What I am more concerned with is the extent to which the modern search for aliens is, at rock-bottom, part of an ancient religious quest."³³

The historian George Basalla made a similar observation in his 2006 work *Civilized Life in the Universe*: “The idea of the superiority of celestial beings is neither new nor scientific. It is a widespread and old belief in religious thought.”³⁴

In a 2017 article in the journal *Motivation and Emotion*, “We Are Not Alone,” the psychologist Clay Routledge and his colleagues found an inverse relationship between religiosity and ETI beliefs—that is, those who report low levels of religious belief but high desire for meaning show greater belief in ETIs.³⁵ In Study 1, subjects who read an essay “arguing that human life is ultimately meaningless and cosmically insignificant” were statistically significantly more likely to believe in ETIs than those who read an essay on the “limitations of computers.” In Study 2, subjects who self-identified as either atheist or agnostic were statistically significantly more likely to report believing in ETIs than those who reported being religious (primarily Christian). In Studies 3 and 4, subjects completed a religiosity scale, a meaning in life scale, a well-being scale, an ETI belief scale, and a religious supernatural belief scale. “Lower presence of meaning and higher search for meaning were associated with greater belief in ETI,” the researchers reported, but ETI beliefs showed no correlation with supernatural beliefs or well-being beliefs.

From these studies the authors conclude: “ETI beliefs serve an existential function: the promotion of perceived meaning in life. In this way, we view belief in ETI as serving a function similar to religion without relying on the traditional religious doctrines that some people have deliberately rejected.” By this, they mean the supernatural. “That is, accepting ETI beliefs does not require one to believe in supernatural forces or agents that are incompatible with a scientific understanding of the world.” If you don’t believe in God, but seek deeper meaning outside of our world, the thought that we are not alone in the universe “could make humans feel like they are part of a larger and more meaningful cosmic drama.”

Given that there is no more evidence for aliens than there is for God, believers in either one must take a leap of faith or suspend judgment until evidence emerges to the contrary to change our credence. I can conceive of what evidence might be for ETI—a captured spacecraft would do—but not for God, unless the deity is a sufficiently advanced ETI as to appear divine. With the decline in religious belief over the past century, perhaps this is what lies behind this quest to understand the unidentified. **S**

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