

Inflation-Theory Implications for Extraterrestrial Visitation

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It has recently been argued that anthropic reasoning applied to inflation theory reinforces the prediction that we should find ourselves part of a large, galaxy-sized civilisation, thus strengthening Fermi's paradox concerning 'Where are they?' Furthermore, superstring and M-brane theory allow for the possibility of parallel universes, some of which in principle could be habitable. In addition, discussion of such exotic transport concepts as 'traversable wormholes' now appears in the rigorous physics literature. As a result, the 'We are alone' solution to Fermi's paradox, based on the constraints of earlier 20th century viewpoints, appears today to be inconsistent with new developments in our best current physics and astrophysics theories. Therefore we reexamine and reevaluate the present assumption that extraterrestrials or their probes are not in the vicinity of Earth, and argue instead that some evidence of their presence might be found in certain high-quality UFO reports. This study follows up on previous arguments that (1) interstellar travel for advanced civilisations is not *a priori* ruled out by physical principles and therefore may be practicable, and (2) such advanced civilisations may value the search for knowledge from uncontaminated species more than direct, interspecies communication, thereby accounting for apparent covertness regarding their presence.

Keywords: Fermi paradox, extraterrestrial hypothesis, extraterrestrial visitation, UFO phenomenon, Condon Report, SETI

1. Introduction

The ever recurring question of why Earth has seemingly not been visited by extraterrestrials (ETs) has received considerable discussion under the topic of 'Fermi's paradox'. The problem originated as a quip by Enrico Fermi to colleagues in Los Alamos over lunch one day in 1950. Whether one assumes the existence of only one other civilisation or of many alien civilisations in our Milky Way galaxy, and whether one assumes colonisation involving interstellar travel at near-light speed or far below, diffusion modeling predicts colonisation or at least visitation of all habitable planets in the galaxy on timescales of tens of millions of years, far less than the approximate 13×10^9 year age of the galaxy itself. Thus the paradox: Where are they [1]?

Theoretical possibilities unknown to Fermi make the paradox even stronger today. One can now rationally conjecture about prospects afforded by adjacent M-brane universes [2]. Indeed, if the multidimensions underlying superstring and M-brane

theory are correct, there could be inhabited universes separated from our own by minute, orthogonal distances. Also, anthropic reasoning has recently been applied to inflation theory, arriving once again at the conclusion that we should find ourselves within an enormously larger galactic civilisation [3]. While the 'We are alone' solution to Fermi's paradox was once a seemingly valid one, this answer is now incompatible with the infinite universe and random self-sampling assumption consistent with inflation theory. We thus find ourselves in the curious position that current cosmological theory predicts that we should be experiencing extraterrestrial visitation. At the same time, current physics and astrophysics suggest that such visitation may not be as impossible as had been thought.

2. Recent Scientific Advances

In recent astronomical discoveries, over 100 exoplanets have been catalogued, with detection

sensitivity now increased to the point where, in one instance, a Jupiter-sized planet was deduced to be in a Jupiter-like orbit around a Sol-like star [4]. In the field of exobiology, much recent activity suggests that some of the building blocks for life may originate in space as well as be transported by meteorites [5-6]. The possibility of widespread panspermia has received new impetus [7-8]. These findings and studies make plausible the hypothesis that there is intelligent life elsewhere in the universe. This is, of course, the fundamental assumption made by the proponents of SETI, the Search for Extraterrestrial Intelligence using microwave or optical means of detection.

The extraterrestrial hypothesis (ETH), that intelligent life from 'elsewhere' in the universe could be visiting Earth, has become less implausible through suggestions that the velocity-of-light constraint—'they can't get here from there'—is not as restricting as had been assumed previously. This restriction has its origin in the special theory of relativity, which we do not question. However, within the context of general relativity (GR) there are three approaches which may permit legitimately bypassing this limit, given sufficiently advanced (perhaps by millions of years!) knowledge of physics and technology.

One approach popularised by Thorne and Sagan concerns the possibility of wormholes, or cosmic subways, a form of shortcut through the space-time metric [9]. Using the standard GR as a basis, certain mathematical requirements for traversable wormholes have been derived and published in the scientific literature and it appears that there is the possibility of engineering a wormhole metric, at least in principle [10].

A second more recent approach published in the GR literature has been dubbed the 'Alcubierre Warp Drive' [11-12]. Unlike the speed of light limit through space, there is no limit to the speed at which space itself might stretch. Faster than light (FTL) relative motion is part of inflation theory, and presumably the universe beyond the Hubble distance is receding from us faster than c . It was shown that a spaceship contained in a volume of Minkowski space could in principle make use of FTL expansion of space-time behind and a similar contraction in front, with the inconvenience of time dilation and untoward accelerations being overcome. A related approach involves constructing a 'Krasnikov tube' [13] to connect spatially remote locales. Of course so-called *exotic matter* would be required for either case.

If GR itself were to be reinterpreted in terms of a polarisable vacuum as first proposed by Dicke [14],

this would open the possibility of a different type of metric engineering in which the dielectric properties of the vacuum might be altered in such a way as to raise the local propagation velocity of light. In effect one would be creating a local index of refraction of less than unity [15].

Finally, there is the conjectured possibility of making use of the additional dimensionalities of M-brane and superstring theory to transfer into adjacent universes where the speed of light limit may be quite different and reentering our universe at the desired location. This is by far the most speculative possibility.

Clearly when it comes to engineering warp drive or wormhole solutions, seemingly insurmountable obstacles emerge, such as unattainable energy requirements [16] or the need for exotic matter [17]. Thus, if success is to be achieved, it must rest on some yet unforeseen breakthrough about which we can only speculate, such as a technology to cohere otherwise random vacuum fluctuations [18]. Nonetheless, the possibility of reduced-time interstellar travel by advanced extraterrestrial (ET) civilisations is not, as naive consideration might hold, fundamentally ruled out by presently known physical principles. ET knowledge of the physical universe may comprise new principles which allow some form of FTL travel. This possibility is to be taken seriously, since the average age of suitable stars within the 'galactic habitable zone', in which the Earth also resides, is found to be about 10^9 years older than the sun [19] suggesting the possibility of civilizations extremely advanced beyond our own.

There are further reasons why the 'We are alone' solution to Fermi's paradox should perhaps be set aside in favor of the ETH. A previously preferred solution, that biogenesis is an exceedingly rare event in conjunction with both panspermia and interstellar travel being inoperative [1], is now scarcely tenable in light of the cosmological considerations already discussed. The ETH appears to be the most viable remaining solution, where 'ET' is taken in a general non-Earthly sense that could include extra-dimensional realms, as in M-brane and superstring theory. Given the highly advanced ET science and technology to be expected in considerably older civilisations, coupled with the many observational reports since WWII of highly advanced technology seemingly operating at will within Earth's skies, it is only logical to search for evidence of ET visitations in at least a fraction of the ongoing, unexplainable reports popularly referred to as 'UFO sightings'. Reluctance to do so could result in our failure to realize

that observations of 'genuine' ET visitations have been occurring. This approach, which we follow here, explores the likelihood that 'we actually do belong to a large civilisation but are unaware of that fact' [3].

3. U.S. Air Force Response (1947-1969)

Reports of unknown objects in the skies, appearing as some sort of flying craft and exhibiting extraordinary manoeuvres, first became known to the general public in 1947. The first publicised sighting occurred on June 24 of that year, after which there were many hundreds of sightings during the following months. The phenomenon has been continuing ever since [20-24].

At first the U.S. Air Force collected the sighting reports for analysis in its operation Project Sign (1948-1949). This was succeeded by Project Grudge (1949-1952) and then Project Blue Book (1952-1969) [20,25]. Some 20% of Project Blue Book's sightings from 1953-1965 were left unexplained, if their 'insufficient data' category is included [22]. The Battelle Memorial Institute (BMI; Columbus, Ohio) discovered, in their study of 3,201 reports from 1947 through 1952, that the percentage of unknowns (unexplainable sightings) *increased* with increasing quality of the sighting information and reliability of the observers [21]. A surprisingly high percentage, 30%, of the civilian sightings, and an even more surprising 38% of the military sightings rated as excellent in quality, were listed as unknown. On the other hand, only about 15% of the civilian and 20% of the military sightings rated as poor were unknown. The increase in the percentage of unknowns with increasing quality of the report is an unexpected result if sightings were all explainable as mistakes (failure to correctly identify the sighted phenomenon) by either the observer(s) or the scientists who analysed the sightings. In this collection of 3,201 sightings none were listed as hoaxes and only 1.5% were listed as caused by psychological effects. This result discovered during the several year long BMI study refutes the claim, made in the Condon Report [22], that UFO reports are from 'less well informed individuals,' who are 'not necessarily reliable.' It is worthy of note that Condon had access to the results of the BMI study but there is no reference to it in the Condon Report.

Project Blue Book culminated in 1969 with the government sponsored Condon Report [22]. In the opening section of the Report its director concluded that, after years of investigation, the U.S. Air Force had found nothing truly new—nothing that supported claims of new physics or the ETH—and that contin-

ued investigation probably would not find anything truly new in the future. The Report recommended that the Air Force end its investigation project, which it did in late 1969.

4. The Condon Report (1968)

In the late 1960's, the U.S. Air Force issued a contract to the University of Colorado to carry out a scientific study of evidence concerning the UFO phenomenon. The director of the project was Prof. Edward U. Condon, a distinguished and influential physicist who made no secret of his opinion even at the outset that no substantive evidence for extraterrestrial visitation was liable to result. The study was relatively brief (2 years) and had a notably low budget (app. \$500K) for a serious scientific study. When the Condon Report was released in 1968, the American scientific community accepted its apparently negative conclusion concerning evidence for extraterrestrial visitation in a generally uncritical way, and to some extent even an enthusiastic way since it offered an end to a troublesome situation. An endorsement of the Report by the National Academy of Sciences took place following an unusually rapid review and the Air Force quickly used the Report as a justification to terminate any further public involvement with the topic.

The negative conclusion of the Report is more apparent than real however, since there is a substantial discrepancy between the conclusion in the 'Summary of the Study' written by Condon singlehandedly, and the conclusion one could reasonably draw from the evidence presented in the main body of the Report. Such a dichotomy was possible because the study was a project for which the director, Condon, had sole authority; it was not the work of a committee whose members would have to reach some consensus conclusion. An analysis of the Condon Report by Sturrock [26] details the many disagreements between Condon's dismissive summary and the actual data.

Given the thousand-page length of the Report, one can safely assume that very few in the scientific community would have devoted the time necessary to read the entire document. The impact of the Report was thus largely due to Condon's leveraging his prestigious scientific reputation into an acceptance of his own personal views as representing the apparent outcome of a scientific investigation. Indeed, as Sturrock documents, Condon actually took no part in the investigations and indicated the conclusion he intended to draw well before the data were properly examined, hardly a scientific approach.

The portion of the Condon Report that contains its sighting analyses does not support the 'Summary of the Study' written by Condon [26]. Many of the events presented within its Case Studies section do fall into the 'unidentified' category of UFOs, for which the Report's definition was, in essence: 'A puzzling stimulus for a report of something seen in the sky or landed on the earth that could not be identified as having an ordinary natural origin.' In a detailed review of this Report, however, it was noted that 'The sheer bulk of the report, much of it "scientific padding", cannot conceal from anyone who studies it closely that it examines only a tiny fraction of the really puzzling UFO reports, and that its scientific argumentation is often unsatisfactory. Of roughly ninety cases that it specifically confronts, more than thirty are conceded to be unexplained' [27]. Four of the cases, reanalysed and reported in detail at the 1969 AAAS Symposium, disclosed how unscientific the Condon Report's treatment of them had been; the reanalyses have since gone unrefuted. Hence we cannot agree with the Condon Report's assertion that the phenomenon provides no new subjects for science to explore, given that many sightings were left unexplained. Furthermore, in many of the cases that the Report claimed to have identified, that goal was achieved merely through *assuming* that the witnesses had seen something differing in detail from what they had reported. Also, a committee of the American Institute of Aeronautics and Astronautics in 1971 found 'it difficult to ignore the small residue of well-documented but unexplainable cases that form the hard core of the UFO controversy'[28]. Clearly, the Condon Report was left in an unsatisfactory state [20,24-26,29-30].

The primary conclusion of the Condon panel side-stepped the main issue, the failure to explain every sighting, by saying: 'The evidence presented on Unidentified Flying Objects shows no indication that these phenomena constitute a direct physical threat to national security' [22]. This is not inconsistent, however, with some fraction of unexplained reports representing actual ET visitations.

5. Re-Evaluation of the Phenomenon Needed

5.1 Sightings Since the Condon Report

The self-inconsistency of the Condon Report, along with the strengthening of Fermi's paradox through recent developments in cosmology, physics, astronomy and astrobiology, are but two reasons to reevaluate the UFO phenomenon. Another reason is that remarkable sightings did not cease with the publication of the Condon Report in 1969. Many detailed

sightings since then have become available for examination. Scientists should not feel reluctant to study these inasmuch as the Report's executive summary stated that 'any scientist with adequate training and credentials who does come up with a clearly defined, specific proposal for study [of UFO reports] should be supported.'

One example of sightings worth studying are those that occurred on December 31, 1978 off the north-east coast of South Island, New Zealand. These involved several channels of information recorded on tape and film during the sightings, correlated visual air- and ground-radar detections and light phenomena recorded on colour movie film as well as reports by the eight witnesses who were involved. Analysis of the recorded data and of the witness testimony indicates that unknown objects emitting bright light were detected on radar, filmed and apparently moved in response to the motions of the airplane carrying the witnesses. The sightings have defied all mundane explanations [31-32].

Some investigations of unexplainable sightings have been sponsored by governments outside the U.S. Since 1977 the French Space Agency has carried out an official investigation of UFO reports with its project GEPAN, later called SEPRA. In the Belgium sighting wave of 1989-90, civilian and military officials cooperated in sharing eyewitness, radar and video-image data of triangular-shaped craft.

5.2 Withheld Information Now Available

The Condon investigators did not have full access to the information and analysis compiled previously by the U.S. Air Force Office of Intelligence (AFOIN) or to all the information collected by Project Blue Book. Much of this information has been disclosed in the years since 1968. The information release has come about on five fronts. First, the U.S. Air Force released the complete files of Project Blue Book in 1975. This release included the previously unavailable files of the Air Force Office of Special Investigation (AFOSI). Second, the U.S. Freedom of Information Act, which went into effect in the mid 1970s, resulted in the release of relevant information from other agencies (Federal Bureau of Investigation: FBI, in 1977; Central Intelligence Agency: CIA, in 1978; etc.), though often in a censored form [23-24].

A third new source of information is the collection of previously withheld reports and analyses carried out by the AFOIN in the late 1940s and early 1950s. This information has been released in the last 20 years as a result of standard declassification requirements for

old documents. It shows that Air Force intelligence privately concluded that as many as 5% of the sightings were unexplainable even though they were apparently accurate reports made by credible observers, thus contradicting the public statements of the Air Force that all sightings could be explained. The documents provide an explanation as to why Air Force intelligence told the FBI in August and again in October, 1952, that some top Air Force officials were seriously considering the 'interplanetary' explanation [33].

Fourth, governments of countries other than the United States, over the last 25 years, have released relevant information collected by their armed services and police. Not only has the French government, through GEPAN and SEPRA, released sighting documents but also England's Ministry of Defense recently released a number of documents. The governments of Spain and Canada also released documents in the 1970s and 1980s. Moreover, some governments besides that of France have official investigative groups on this topic. In 1997, in response to civilian and military sightings over the previous years, the Chilean Air Force formed the Committee for the Study of Anomalous Phenomena (acronym, CEFAA in Spanish) directed by a former Air Force general and headquartered in the Technical School of Aeronautics in Santiago. One of us (Maccabee) was invited to Chile in 1999 to lecture at a symposium sponsored by the CEFAA and to discuss the sightings. The Peruvian Air Force set up a similar group in 2001. Brazil and Uruguay also have comparable investigative groups.

A fifth new source of information not available or utilised by the Condon group consists of the many witnesses to events in the 1940-1960 decades who had worked for the government or the military and after reaching retirement age, have come forward to divulge their first-hand knowledge [34]. They have felt it was more important for the citizens to know what has been taking place than to continue to obey instructions to maintain silence about it. A reluctance to report UFO events arose because of a curtain of ridicule which, since the 1950s, had settled over the subject. It was induced in part by the CIA's 1953 Robertson panel that recommended a debunking programme against the reality of the phenomenon [20,22-23].

The debunking is most often implemented by an authority figure asserting, at his own volition and without interviewing the witnesses, that whatever was observed and reported as extraordinary was instead the misidentification of something mundane. This is demeaning to sincere, credible witnesses. The major news media quickly picked up on sarcas-

tic phrases like 'little green men' and 'UFO buffs', then gradually weaned themselves away from the topic—reporters, editors and corporate owners fear ridicule, whether just or unjust, as much as do scientists and politicians. The refusal of the U.S. Air Force in the 1950s and 1960s to release sighting data it had collected only added to the problem, since evidence collected by the government was not available to support the witnesses [33].

The first director of the CIA assessed the situation in 1960 as follows: 'Behind the scenes, high-ranking Air Force officers are soberly concerned about UFOs. But, through official secrecy and ridicule, many citizens are led to believe the unknown flying objects are nonsense... to hide the facts, the Air Force has silenced its personnel' [35]. The Condon Report also added to the problem, since it demonstrated that men of science could simply allege that witnesses are mistaken or dishonest and they would be believed by most of their colleagues even though they had no evidence to back up their allegations. This in turn led to greater reluctance on the part of witnesses to come forward. As a result, 'the most credible UFO witnesses are often those most reluctant to come forward with a report of the event they have witnessed' [27]. This ridicule factor has prevented many serious investigators from even attempting to report their findings within the journals preferred by most scientists. Therefore, one of the recommendations made by the moderator of a 1997 panel of scientists is that journal editors should change their policy of refusing to even seriously consider publishing articles related to the UFO phenomenon, so that this difficulty may be alleviated [36].

6. Inferring an ET Strategy

If one allows that at least some unexplainable sightings may be manifestations of extraterrestrial intelligence, then there is yet another reason for reevaluation: a growing recognition over the past two decades that a large part of the behavior manifested can be viewed as being quite rational. The topic of ET behavior has received considerable discussion in connection with SETI in the past three decades. SETI has proceeded on the assumption that Fermi's paradox is to be solved through continued and enhanced searching of the sky for electromagnetic signals indicative of ET communications [37]. Several possible reasons for lack of success to date have been proposed [1,37-38].

Since the 1970s advocates of a covert ET presence in our vicinity have also been advancing their hypotheses or scenarios. They reject as improbable

the assumption that space-faring ETs must be dominated by the most evil and aggressive of their kind—an assumption whose consequence would be that we should not be existing as a freely developing civilisation within a fully colonised and/or explored galaxy. Contact optimists instead presume that many advanced ET groups are at least as ethical as we are, while still attending to their own safety and security. The ET motivation for space travel could be to increase their knowledge through exploration of space rather than to colonise and seek domination [39]. Thus hypotheses have been set forth regarding why such ETs would be aware of our presence but not yet have contacted us overtly. Among these are the zoo, nursery and quarantine or embargo hypotheses [1,38,40-42]. Most of these posit that the ETs involved have frequently scouted us out semi-covertly and have concluded that we are either not yet mature enough for open contact, or not prepared for it, since any abrupt, overt contact could cause societal chaos and governmental downfalls. Also posulated is that ET interference with our society would prematurely bring an end to our civilisation's continued development if it occurred before our knowledge has progressed to the point that we could understand where the aliens could have originated and how great their head start over us could be [39].

A serious inconsistency in this reasoning, however, is that maintenance of total ET covertness towards Earth and the solar system would still lead to societal chaos whenever the covertness or embargo was eventually lifted, unless the ETs carried out a programme of gradual disclosure—a 'leaky' embargo [1,43]. Although the zoo or embargo hypothesis may be unverifiable, the leaky-embargo hypothesis may be verifiable if the UFO evidence is taken into account. Much of this evidence appears to constitute just such a leak in the embargo: a grass-roots educational programme in the form of the phenomenon, which has been in operation since 1947, if not before.

Many sightings have been of a nature to attract attention to their craft and let isolated groups of witnesses know that its occupants are aware of us [24,44]. A key category of such cases involves reports wherein persons within a traveling vehicle frantically witness an object pacing them even though their automobile or aircraft makes turns that rule out the sighting of an astronomical or other ordinary object as any explanation. Similarly, in a number of the aircraft cases the unknown object, which was either pacing the aircraft or presenting itself to it, was detected on radar as well as visually [23-25,27]. The object's extraordinary appearance, manoeu-

vreability and oft-times coincidental interference with the vehicle's electrical system additionally rule out mundane explanations [23-25].

Although individual, localised and usually brief sightings may have provided sufficient evidence to be convincing to the observers and sighting analysts, the fact is that, since the widely-reported sightings began in 1947, no event has persisted in a prominent place a sufficient number of hours at a time, or demonstrated its abilities to enough witnesses at a time, for the news media to congregate and publicise it to the world. Nor have they left quite enough evidence behind to be totally convincing to very many scientists [25]. We suspect that this chary behavior may be no accident.

To put it another way, from the viewpoint of investigators studying such phenomena, individual close-encounter and other sightings can be very intrusive and overt. However, from the viewpoint of the scientific community and society as a whole, this is not the case, because of the relative rarity in time and space of convincing sightings and because of the limited numbers of witnesses in most instances. The inference is that, by not providing sufficient evidence to make their reality totally obvious to scientists and society in general, the ETs are following a strategy or programme that avoids inflicting catastrophic shock to society as a whole, which any overt contact could cause, while preparing us for eventual open contact. This could say something about their level of ethics.

Proposing a certain level of ET ethics is not new; it was suggested in 1981 that advanced ETs may abide by a Codex Galactica that would require them to treat emerging civilisations delicately [1,45]. Such a standard of behavior is consistent with reality of the UFO phenomenon and the fact that not in the past 56 years, nor in past millennia, have we been colonised, conquered or exterminated, nor has society been traumatised by any ETs or by their sometimes postulated robotic probes [1,41]. It is also consistent with the failure of investigative panels to find that UFOs constitute any direct threat to national security. On the other hand, it appears all too evident that ETs have not intervened in world affairs in any benevolent manner that would have forestalled human warfare, famine and disease. In fact, ample cases exist wherein the witnesses, when too close, were injured or harmed. Other cases exist, however, in which a witness was healed of some injury or medical condition [46]. All this suggests that ET interactions with humans are based on a neutrally benevolent ethical level overall.

7. Conclusions

Despite the UFO phenomenon having continued now for over two generations, the huge technological head start of the presumed ETs would still come as a great shock to many scientists as well as citizenry, as the Brookings Report indicated [47]. It could be so great as to seriously challenge our consensual reality, a not insignificant danger. The implication that we would be powerless relative to their presumed capabilities and evolutionary advantage may be most unwelcome, with it being no surprise that science would have difficulty coming to terms with the situation [48]. Nevertheless, the reality of the phenomenon and of our having long since been discovered by

advanced ETs now may be more probable than that Fermi's paradox is to be resolved through either the non-existence of advanced ETs or their inability to explore or colonise the galaxy. Hence open scientific research on the subject is needed with special attention paid to high quality UFO reports exhibiting apparent indications that ET intelligence and strategy are involved.

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