Essay

The Fundamental Policy of First Contact

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Abstract: Should our planet be visited by an extraterrestrial civilization, the prevailing assumption would undoubtedly be that the extraterrestrial civilization is Type I i.e. its capacity for interstellar travel results from its technological development. This assumption is dangerous for it unnecessarily leads to the Extraterrestrial Tandem Hypothesis (ETH): the belief than an extraterrestrial civilization technologically capable of interstellar travel must also be technologically compatible with the inexorably rapid annihilation of life on Earth. Such a state of things would compromise the planet's capacity to stage a confident defense should the extraterrestrials prove belligerent. The presumption of Type I extraterrestrials (on the premise of the capacity for interstellar travel alone) is unfounded as extraterrestrials may be Type II i.e. capable of interstellar travel by virtue of natural intrinsic or extrinsic factors. This paper advances, most importantly, that the fundamental policy of first contact should be the employment of various strategies toward the evaluation of the technological capacity of visiting extraterrestrials. This evaluation must be particularly devoted to the detection of Type II extraterrestrials masquerading as Type I (using concealment and Wizard of Oz strategies). Integral to this detection are the concepts of the precedence relation and The Extraterrestrial Exclusion Principle (EEP). A precedence relation is a qualitative relation expressing the relative difficulty of producing a technological action. The Extraterrestrial Exclusion Principle states that a Type I extraterrestrial life form is excluded from certain actions. Such actions are lower in precedence than interstellar travel and may be described as in violation of the EEP or EEP forbidden. EEP actions reveal extraterrestrials to be Type II. As an example, the value of the Hawking Warning is subjected to EEP analysis. Furthermore, a hypothetical conundrum in linguistics termed the Kryptonian Linguistic Paradox (KLP) is discussed as a case of an EEP forbidden act. Finally, the paper explores the limitations of the stated fundamental policy of first contact.

Keywords: first contact; Type I extraterrestrial; Type II extraterrestrial; EEP forbidden; Hawking Warning; Kryptonian Linguistic Paradox

1. Introduction

Hollywood cinema seems fond of portraying extraterrestrials (ETs) in the most pessimistic light: savage humanoid creatures bent on resource acquisition and imperial domination or annihilation of humanity. Despite the embellishments and queer motives often imputed to these ETs and the inevitable anthropocentricism guiding their intent and appearance, these Hollywood portrayals cannot be denied their relevance.

ETs are prime examples of the unknown and Hollywood cinema does little more than mirror our fear of ETs. Contrary to what seems the prevailing view, there exists a species of ET researcher that argues confidently for the benevolence of ETs. This presumption of benevolence seems to be increasing in formidability: a fashionable alternative to the "anthropocentric" and therefore "backward" view that ETs are generally malevolent. Lurking in the shadows of this "benevolence hypothesis" seems to be the unfounded belief that benevolence increases in proportion with intelligence as well as a repressed fear of extraterrestrials (which coerces one to participate in euphemisms of the kind which had the Greeks bestow the conciliatory epithet of Eumenides or "gentle ones" on the dreadful Furies). Certainly, heightened intelligence is not antithetical to belligerence. But a man who would measure ETs against the yardstick of *Homo sapiens* would be actively engaged in rendering himself guilty of a most deadly academic sin: anthropocentricism. The avant-

 doi:10.20944/preprints202302.0480.v1

garde notion is disputably that ETs have very little in common with humanity. It appears that the greater the departure of ETs from human resemblance and motive, the greater the verity, sophistication, or prestige of the speculation. Such notions seem unfettered by the view that idle speculation is just as useless (or even more useless) than anthropocentricism. Besides, many ideas may carry only the semblance of anthropocentrism without being motivated by it. The universality of evolution (and the concomitant competition for resources), hierarchical power relations among ET civilizations, individualistic morality, intellectual indifference, and the nature of sentient existence itself may all be unraveled and proffered as cogent "non- anthropocentric" supports for ET belligerence.

I completely agree with the pronouncement by Martin Dominik and John Zarnecki [1] that "with no other account for life other than that on Earth and a lack of understanding of the properties and preferred environments of life as we do know it, one readily tends to accept the null hypothesis that an efficient search should be oriented towards the set of conditions that is defined by the variety of terrestrial life forms" and that "if data is absent or ambiguous, we tend to argue by retreating to analogies or theories about universalities."

Moreover, in the final analysis, excessive theorizing in either direction – support for ET benevolence or malevolence – leads nowhere. As first contact is a matter which presents a potential existential risk, this alone should motivate us to adopt the policy that ETs are belligerent until proven otherwise. On this premise, should ETs prove belligerent on first contact, we would at least have a measure of consequential preparation (especially if ETs are Type II). On the other hand, if ETs prove benevolent, well, we simply accept the benefits and relax our initial view. Despite this cautious viewpoint, a discussion of the possible benefits of first contact will not be neglected.

As a preliminary to a discussion of the effect of first contact, the author mechanically classes ET interaction with mankind as either benevolent, neutral, or malevolent. Discussion of a subject of such enormity, however, leaves no place for inconsequential musings on how ETs may act neutrally. Thus, we are left with the benevolent and the malevolent.

There is an abundance of literature devoted to speculation on how a benevolent extraterrestrial civilization might interact with humanity. A lot of it seems to discuss what I have termed the *pedagogic beneficence* of extraterrestrials i.e. their teaching of moral and technological ideas important to the sustainable and long-term development of humanity. Psychologist Albert Harrison and astronomer Steven J. Dick proffer that, perhaps beginning with collaboration in the arts and humanities [2], an advanced civilization might teach humanity such sought after knowledge as unified theory of physics, how to exploit zero-point energy and how to travel at superluminal speeds [3]. Lemarchand [4] also suggests that ETs, in their bequests to a civilization in its "technological adolescence" (such as humanity), would probably prioritize morality and ethics rather than science and technology, to preclude self- annihilation due to premature exposure to new technology. Michaud advances that fear engendered by the mere presence of ETs may be enough to motivate nation- states to lay aside their differences and collaborate for the collective defense of humanity [5].This sentiment was shared by president Ronald Reagan who, in his 1987 speech to the United Nations General Assembly, remarked: "I occasionally think how quickly our differences worldwide would vanish if we were facing and alien threat outside this world."[6] Still, a benevolent ET civilization may calibrate its interaction with humanity so as to minimize unintentional or unforeseen deleterious effects [7]. This may mean the adoption of a non-interventionist policy. According to Michaud [8], an advanced benevolent civilization might adopt the policy of eschewing all contact with a nascent sentient civilization like humanity in order to avoid unforeseen harm which may arise from accelerating the natural development of the nascent civilization.

A prominent theory expressed by Tough [10] and related by Seth D. Baum [9] and Harrison and Dick [3] in support of the benevolence of ETs, is that the longer lifespan of cooperative civilizations vis-à-vis uncooperative or belligerent ones as well as the memory of the calamities of their own past warfare might render ET civilizations more likely to help humanity. Sagan hypothesized that a civilization with the technological knowledge

 doi:10.20944/preprints202302.0480.v1

for interstellar travel, having averted self-destruction, must have transcended war, and infers that representatives of such a civilization would treat humanity with dignity and respect [11]. Another supportive theory is that opportunities for war among ET civilizations with access to a galaxy may be significantly attenuated by an abundance of natural resources in space [12,13].

Contrary to the benevolence viewpoint is the important idea, proffered by Paolo Musso, that technological progress and cooperation among members of an ET civilization, like humans, may be motivated by individualistic morality and not entirely by altruism, thus permitting the possibility that at least some extraterrestrial civilizations are malevolent [14]. This may be supported by the anecdotal sociological observation that moral development tends to lag behind technological advancement. This very fact is also proffered as a negative side-effect of ET assistance in the form of technological knowledge as such bequests further increases the gap [15].

The hierarchical structure and attendant power relations implicit in the "galactic clubs" discussed by Harrison [13] also point to the possibility of conflict among extraterrestrials (perhaps issuing from misaligned agenda among groups). Michaud goes as far as to question the possibility of cooperation among such intra-galactic unions, saying that civilizations with huge disparities in technological development and access to resources "may not consider themselves even remotely equal". [16]

In keeping with the pronouncements of Dominik and Zarnecki [1], the consequences of extraterrestrial contact have often been depicted as analogous to the meeting of two disparate human cultures, particularly that of Columbus and the Amerindians or Cortez and the Aztecs. These meetings resulted in the partial or total annihilation of the contacted civilization by the contacting civilization (presumably because the explorative capacity of the contacting civilization is predicated on comparatively advanced technology). Despite its disheartening brutality, such a scenario cannot be disregarded as a plausible consequence of extraterrestrial contact.

Furthermore, evolutionary theory supports conflict scenarios even for the most advanced civilizations. For example, Ragbir Bhathal espouses that, given the universality of laws of evolution, even an exceedingly advanced ET civilization may have sufficient motive to exploit Earth [17]. As he puts it, "[i]f it is assumed that the laws of physics and biology are the same here as elsewhere in the universe, then the evolution of life in all parts of the universe would have progressed from the simple to the complex. In the process Darwin's philosophy would have been uppermost. Almost everything in the universe would fall under the control of the most fit, most intelligent, and the strongest…This has been the history of human civilizations throughout the ages. There is no a priori reason that ETI civilizations will be any different. They would also want to control the resources of the universe or other galactic civilizations for their own ends. The history of Earth civilizations will be mirrored in the civilizations in other parts of the universe."

Even if we exclude the intentional malevolence of ETs, there is also the possibility that humans may suffer from unintended side-effects of extraterrestrial contact (direct or indirect). An important example of such a side-effect is demoralization and loss of identity and confidence in the face of technological and cultural superiority of advanced ETs that wish to help humanity [9,15,18,19]. Another highly plausible side- effect is ecological and biological contamination via pathogen transfer, and the resulting decimation of human populations either directly or through the devastation of plant and animal life [9]. Furthermore, if the ET departs radically from human biology, it is not inconceivable that its modality of contamination could expand to include such events as toxic secretions and the emission of deadly radiation. Finally, and by no means exhaustively, we must contend with the unintended harm that results from the potential moral indifference of ETs – an indifference presumably predicated on intelligence disparity and/or existential and communication barriers. For example, when one destroys a termite nest to make room for a new structure, one is hardly ever confronted by the moral dilemma: to kill or to not kill? The failure of the (inadvertent) killing of termites to evoke a moral response (which most likely stems from the intelligence separation between humans and termites, with

 doi:10.20944/preprints202302.0480.v1

inhibition tending to increase in proportion to the intelligence separation) should make us shudder at the treatment that could be meted out to us if visited by ETs who are as far removed from us as we are from termites.

The author maintains that the notion that malevolence attenuates with technological advancement cannot be established with any force and that in the face of events of unknown effects, it is safest to presume that the effects are harmful. Furthermore, the author believes that the propensity for destruction and violence is not exclusively human but a shared ontological attribute of all sentient life forms.

2. Theory

2.1. Assumptions

This paper is founded on three key assumptions, namely that an extraterrestrial contact involves a direct visitation, that extraterrestrials behave in a manner consistent with the idea of a civilization, and that any visitation of extraterrestrials requires interstellar travel.

The first assumption certainly does not hold in reality. There are indirect possibilities for extraterrestrial contact such as contact via electromagnetic waves or artifacts [20- 24]. The assumption has been admitted on the premise that direct contact is the most consequential mode of contact and therefore permits the fullest expression and employment of *Extraterrestrial Exclusion Principle (EEP)*. Also, though the other contact modalities may be subjected to EEP analysis, there is an inherent difficulty in such analysis since the electromagnetic waves or artefacts would convey information about the past state of the ET, not its present state. The hardness of this problem lies in the difficulty of extrapolating the present state of a civilization from its past state and is off course proportional to the time separating the transmission and receipt of the message.

The assumption that an extraterrestrial may be referred to as a civilization or that it takes the form of a civilization is employed as a strategy for dispensing with the necessity of handling the many speculative modalities of the nature of extraterrestrials. Certainly, an extraterrestrial need not take the form of a collective of individuals with the characteristics we traditionally ascribe to terrestrial civilizations (complexity, social stratification, writing/communication systems, technological developments etc.). This deliberate restriction serves to uphold the relevance of EEP analysis: an extraterrestrial for which the concept of civilization is entirely inapplicable may render EEP analysis of very limited utility.

The third assumption is also framed to sustain the relevance of the EEP. The EEP, the centerpiece of this paper, states that a Type I extraterrestrial is precluded from performing certain actions. If an extraterrestrial performs such actions, then it must be Type II. Both Type I and II extraterrestrials, integral to the definition of the EEP, refer to extraterrestrials with the capacity for interstellar travel. A corollary of the third assumption is that there are no sentient extraterrestrials within the solar system (as such ETs would not require interstellar transport).

2.2. Standard Precedence Relations

A precedence relation is to a relation expressing the relative difficulty of producing an action. For example, the statement that it is more difficult to produce the steam engine than paper implies a precedence relation. We may say that paper precedes the steam engine (or in shorthand, paper > steam engine). We may also say that if a civilization can perform the action of producing steam engines then it can also perform the action of producing paper. The preceding technology is termed the *precedent* or *antecedent* while the succeeding technology is termed the *subsequent*.

The precedence relation is of a purely ordinal character. No attempt shall be made to render it cardinal. We shall therefore not make statements of the following kind: it is twice as difficult to produce the steam engine as it is to produce paper.

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A precedence relation, A > B, does not mean that the existence of B implies the existence of A, but that the existence of B (which prerequisites the knowledge, material technology and/or social technology for B) implies the existence of the knowledge, material technology and social technology prerequisites of A. In order words, A > B, does mean that if a civilization does A then it does B but rather that if it does A, then it can do B (if it is so inclined). Furthermore, the use of narrowly define precedents and subsequents can lead to misapplication of the concept. For example, a civilization may have produced an item sufficiently different from paper but with equal utility as a storage device. Another civilization confronted with this new storage device X may be misled (by the newness of it) into inferring that paper > X when in fact paper and X are equivalents (paper = X) i.e. it is as difficult to produce paper as it is to produce X. In order to avoid such misapplication, the operands of the precedence relation (the precedent and subsequent) may be expressed as more generic objects. Rather than the precedence relation, paper > steam engine, it should be storage device for written information with information density of approximately w (where w is the information density of paper) > heat engine for performing work at efficiency approximately x (where x denotes the efficiency of the steam engine).

Precedence relations may be referenced to a standard action. Such precedence relations are referred to as standard precedence relations. In this paper, interstellar transport is employed as the reference action. Using interstellar transport as the reference action, the production of fire, the steam engine and the electronic computer unquestionably fall under the category of precedents. Otherwise, planetary scale megastructures and galactic-scale energy harvesting may be safely considered subsequents.

2.3. The Extraterrestrial Exclusion Principle

Should planet Earth be visited by an extraterrestrial life form, it is not unwarranted to surmise that amidst the likely pandemonium and euphoria of this (apparently) unprecedented event, will be a flood of inquiries and presumptions as to the intentions of the extraterrestrials. The ETs would more than likely be deemed belligerent. This presumed belligerence would be rendered ever more threatening by the not uncommon belief that an ET capable of interstellar travel would be able to annihilate humanity with minimal effort [25]. Such a simple assumption is most dangerous as it psychologically compromises mankind's ability to mount a defense should the ETs prove belligerent. Humanity may hold the assumption that it is fighting a losing battle when this may not necessarily be the case. The Extraterrestrial Exclusion Principle (EEP) provides an alternative to the dismal viewpoint that an ET with the capacity for interstellar travel must necessarily be extremely advanced in technology. EEP also acts as a scheme for appraising the technological power of the ETs which could provide leverage for mounting attacks against them should these ETs prove belligerent.

The Extraterrestrial Exclusion Principle states that a Type I extraterrestrial civilization is precluded from certain actions. Such actions may be described as in violation of the EEP or EEP forbidden. Furthermore, the performance of EEP forbidden actions by an ET reveals it to be Type II. The use of standard precedence relations affords a redefinition of the EEP as: A Type I extraterrestrial civilization is able to perform all acts antecedent to interstellar transport. Therefore, if an ET visits Earth and performs actions or possesses motives that contradict its capacity for interstellar travel (for example, its prime motive is gold mining), then it must be Type II.

A Type I extraterrestrial civilization refers to one whose capacity for interstellar transport is the result of technological knowledge. These are the ETs for which the rapid annihilation of humanity is within their technological capacity. These are the extraterrestrials that should be rightfully feared should they prove belligerent.

However, the EEP mentions a second Type of ET: The Type II. A Type II extraterrestrial civilization is one possessing the technology for interstellar travel, not by virtue of technological knowledge but *extrinsic* or *intrinsic* natural attributes. Intrinsic natural attributes conceivably include the existence as pure energy (e.g. a sapient entity composed

 doi:10.20944/preprints202302.0480.v1

of interacting photons), affording transport at luminal speeds, or existence which facilitates bending of space-time. Extrinsic attributes include access to user-friendly, ready-made technology, either naturally occurring or left by advanced civilizations, for example wormholes. The possible existence of Type II ETs means that we need not presume that a visiting ET is Type I. As has been mentioned, the presumption is dangerous. Type II ETs may well be comparable to human civilization in technological capacity and perhaps even inferior. Without the EEP concept, humanity may be inclined to dogmatically adhere to the assumption of the technological superiority of a visiting ET even if it performs actions or possesses motives that contradict that presumed superiority. The EEP clearly states that a visiting ET need not be technology superior and consequently shields against the aforementioned dogmatism and its effects.

It is important to point out that ETs may be fully cognizant of the EEP or at least casually knowledgeable of it. For that reason, Type II ETs, to obviate EEP analysis and its capacity to divulge them to be Type II, would, if they have belligerent intent, most likely adopt a policy of concealment, or participate in *Wizard of Oz strategies*.

That concealment increases the difficulty of EEP analysis is obvious as EEP analysis is based on gathering information with the view to gauging the technological capacity of the ET. It may very well disclose the ET to be Type II if it can be proven that the ET performs EEP forbidden actions. Given the multiplicity of the cues that can be subjected to EEP analysis – language, appearance, technology, motives – the ET would have to participate in total concealment in order to render EEP analysis null. However, since the ET must interact with humanity in some way, then it cannot practice total concealment but may conceal those actions that are most susceptible to EEP analysis.

An ET employs *Wizard of Oz strategy* if it is engaged in signaling with the intent of inducing observers into believing that it is more technologically advanced than it really is. The concept is taken from Frank L. Baum's The Wonderful Wizard of Oz in which the title character deceptively invents an intimidating persona of supreme power when in fact he is no more than a weak, old man.

Either Type II ETs reverse employ the EEP or they do not. If they do not, then their Type II status may be easily divulged by humans making use of EEP analysis. If the Type II ETs reverse employ the EEP (i.e. the avoid detection by EEP analysis by using concealment or Wizard of Oz strategies), then it may still be possible to infer their Type II status if one can detect the very act of concealment or the employment of Wizard of Oz strategies.

In order to demonstrate the validity of EEP analysis it may be necessary to invert the traditional first contact scenario which adopts humans as the contacted civilization and instead consider humans as the contacting civilization.

Imagine that in the year 2017, humanity accidently discovers an interstellar portal (presumably left by an ET which once lived in our solar system) during a flight to mars. This portal, a type of wormhole technology, allows one to travel to a zone a few thousand miles away from a planet within the Alpha Centauri star system (which is 4.37 light years from Earth) in a matter of minutes. Taking no heed of the EEP, humans hastily decide to explore and colonize that planet. They soon discover that the inhabitants of that planet are bipedal mammalians strongly resembling humans in appearance and, in intelligence, social structure, morality and religion, also strikingly human. They also learn that the Alpha Centaurians have no knowledge of or access to interstellar transport (they have not discovered the wormhole which communicates to Earth). The Earthlings are impressed with the quantity of oil that seems abundant on this planet and start to exploit the Alpha Centaurians into mining oil so that they could transport it to planet Earth. The Alpha Centaurians suffer the exploitation and put up no resistance, believing the earthlings to be technologically superior although no strong evidence has been given in support of it. The Alpha Centaurians, who assumed that the earthlings are Type I, despite their appearance and the performance of many EEP forbidden acts, then become disturbed by the Earthlings' obsession with oil. They begin to question why a civilization with the capacity for interstellar travel would also not possess access to a cheap source of energy (rather than resort to oil). They then suspend such questioning, hypothesizing that there must be

 doi:10.20944/preprints202302.0480.v1

rational reasons why the Earth ETs are interested in oil. Ten year into the exploitation, the policy makers of the Alpha Centaurian planet discover a paper titled: *The Fundamental Policy of First Contact* by a little known, misunderstood and dismissed Alpha Centaurian scientist. The paper advances a strategic principle very much like the EEP. This principle allows the Alpha Centaurians to rationalize their initial suspicion of the Earthlings' "oil motive" and to infer that the Earthlings are Type II ETs. This discovery boosts their confidence and allows them the courage to mount an offensive against the humans. The story ends with the successful repulsion of the humans across the wormhole. The exodus of the human colonizers via the wormhole permits its discovery by the Alpha Centaurians. In the end, the two peoples settle on a truce and begin an amicable sharing of culture.

This tale is deliberately optimistic. A civilization unaware of the Extraterrestrial Exclusion Principle is more likely to be annihilated by Type II belligerent ETs when such an outcome can be obviated.

3. Precedence Relations and the Hawking Warning

The Hawking Warning refers to the caution espoused by the British scientist Stephen Hawking that it is careless and unsafe to attempt to contact extraterrestrials on the premise that we are in fact revealing our position to potentially belligerent or imperious extraterrestrials [26]. The admonition, though well-intentioned, may be unwarranted.

The Hawking Warning tacitly assumes that extraterrestrial contact with Earth (after we have inadvertently revealed our position to belligerent ETs) > the efficient and unilateral locating of extraterrestrial sentient life forms (by unilateral locating it is meant the capacity to detect ETs that do not want to be detected and who implement policy to minimize contact). The assumption is not untenable as the assignment of the precedence relation between the capacity for making contact (after the position of the ET to be contacted has been revealed by their own attempt to make contact) and that for the efficient and unilateral locating of extraterrestrial life forms cannot be established with any force. We shall first demonstrate the legitimacy of the Hawking Warning on the presumed verity of the aforementioned assumption, followed by its invalidation (under the condition that the efficient and unilateral locating of extraterrestrial sentient life forms > making extraterrestrial contact).

If we assume making contact > efficient and unilateral location of sentient life forms, then we may imagine a species of imperious extraterrestrial which, though possessing the technology for mediating contact, is unable to efficiently and unilaterally detect other sentient life forms i.e. it can do no better than wait (not necessarily strategically) for other sentient life forms to reveal their location while attempting to make contact (in the manner of the SETI project). Given this situation, the search for extraterrestrials amounts to increasing the likelihood of detection by the aforementioned ETs, rendering the Hawking Warning worthy of consideration.

The Hawking Warning presupposes an ET capable of making contact. If efficient and unilateral locating of sentient life forms > making contact, then a civilization with the technological capacity to make contact presupposes the technology for the efficient and unilateral locating of ETs. Therefore, by transition, the Hawking Warning presupposes the technology for the efficient and unilateral locating of ETs. However, if the Hawking Warning (which fears the adverse consequences of humans attempting to make radio contact with extraterrestrial life forms) presupposes that those we wish to contact already know where we are, then the warning is rendered immaterial.

4. The EEP and the Kryptonian Linguistic Paradox

If we assume that all ETs are Type I, then many of the motives often imputed to ETs in Hollywood or science fiction would be inconsistent with their Type I status. These motives include: a desire for gold, a new home or a food supply.

 doi:10.20944/preprints202302.0480.v1

Here, I tender, not a motive, but something even more fundamental. By way of a hypothetical linguistic conundrum termed the Kryptonian Linguistic Paradox (KLP), I present language itself as the object of EEP analysis.

The debate about the origin of language is the most contentious within the linguistic community. The two main competing schools of thought are that of the "continuity theorists" like Pinker who believe that the complexity of language forbids its sudden emergence but rather supports its gradual evolution over a significant time scale [27- 29] and that of the "discontinuity theorists" like Chomsky who argue for the sudden emergence of language, perhaps occurring about 50, 000 years ago [30]. Another source of contention is the question of whether language is a genetically-encoded innate cognitive faculty [27-31] or whether it is acquired mainly through social interaction [32, 33]. Laying aside these age old and intractable debates, the author wishes instead to proclaim the relevance of a few speculative theories on the origin of language discussed in Roy Harris' *The Origin of Language* [34]. These theories advance that early language was largely mimetic or based on acoustic, emotive or abstract accordance between signifier and signified. Two of these, first discussed by Muller in his 1866 publication Lectures on the Science of Language (delivered in 1861), are the *bow-wow theory* and *the pooh-pooh theory* [35]. The *bow-wow theory*, which Muller ascribes to Herder, espouses that early language existed as imitations of the animal sounds and the sounds of nature. The *Pooh-pooh theory* advances that early words were emotional exclamations elicited by pleasure, pain, anger, surprise and other kindred emotions. Two other theories, the *Ding-dong* theory and *Yo-he-ho* theory postulate that early language developed as an expression of a kind of resonance with nature and the rhythm of muscular and other body sounds such that which accompanies "mating, feeding, fighting, flight and festal occasions", respectively [34].

It is consensus in the linguistic community that earliest writing systems emerged out of the ancient civilizations of Sumeria [36-38] and Egypt [39]. These systems based on pictograms (pictures which resemble what they signify) and ideograms (symbols which represent ideas) later developed into logographic writing systems [40-43]. A logographic writing system is one in which visual symbols represent words. This contrasts with phonographic writing systems (to which the English language belongs) which are based on units of sound or phonemes [44].

The aforementioned mimetic theories of language origin (though highly speculative and of dubious relevance) and the pattern of evolution of writing systems both point to a progressive attenuation of the resemblance between signifier and signified. The author hypothesizes that this intimacy or congruence between signifier and signified represents a limitation to the expressive power of language. By relaxing this intimacy, languages can increase in expressive power. Thus natural selection for reduced resemblance between signifier and signified or for increasing expressive power is driven by the selection for technological development (which depends of the level of expressive power).

The Kryptonian Linguistic Paradox (KLP) addresses the seeming absurdity that an advanced extraterrestrial civilization like the Kryptonians from DC's *Superman* employs a writing system which, by its apparently ideographic symbols, is syntactically and semantically inferior to the English alphabet.

Ironically, the ideographic character of Kryptonian was ostensibly meant to convey the advanced state of the Kryptonian culture. Readers were expected to misconstrue an esoteric assortment of symbols for a syntactically and/or semantically complex language. By the complexity of a language, I mean the expressive power of that language.

I shall not endeavor to justify with any great effort, the pronouncement of the syntactic and semantic inferiority of any pictographic language. On the need of a superior language as a prerequisite for the technological advancement of civilization, I will say no more than that a civilization develops technology to the extent of the expressive power of its predominant language of communication.

The purpose of the KLP is to highlight that the language employed by the extraterrestrial yields invaluable information about its technological capacity and should be a

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prime focus in the EEP scheme. Judged according to their language, the EEP scheme reveals Kryptonians to be Type II.

The employment of the EEP scheme to detect Type II ETs masquerading as Type I is not without its shortcomings. A fundamental error issues from this discussion on the KLP: how do we know for sure that a given ET language is ideographic? Its ideographic character may merely be an artifact of our limited knowledge. The error considered here is termed the *ambiguity error*.

On the subject of languages, I now make issue with a second possible error (which falls under the more general *illegitimacy error*): the intuitive confounding of the intelligence of the medium of communication with the intelligence of the semiotic system of communication. The former constitutes the technological sophistication of the method or means of communication while the latter constitutes expressive power of the language. Take for example, an ET which masquerades as Type I when in fact Type II. We know that this ET communicates telepathically but we know nothing about the contents of the messages communicated by this method. There is a tendency to judge its telepathic capacity as a premise for its technological superiority, when in fact this is not necessarily so as it is conceivable that organisms of the intelligence of jellyfish may use a sort of telepathy for very simple communication. If we later discover that the content of this communication is in fact limited to a few instructions, then we may be forced to recant our initial presumption that the ET is technologically superior. We have performed the *illegitimacy* error because we have illegitimately employed the medium of communication as the object of EEP analysis when it would have been more consequential to employ the content of the communication as the object. This is because EEP analysis of the content rather than the medium is a more reliable measure of the technological advancement of the ET.

Let us now look at the intelligence of the semiotic system or equivalently its expressive power. If it is inferior to English, it may easily be evaluated as such, assuming that it surmounts the *ambiguity error*. However, if it is superior, it may be impossible to tell that it is so and if that can be done, it may be difficult to gauge the extent of its superiority owing to our limited knowledge of the time-evolution of languages. This limitation we term the *asymmetry error* because actions that are objectively precedent to a standard action are more accurately or confidently assigned precedence relations than actions that are objectively antecedent.

5. Limitations of the EEP

In our discussion on the KLP, we introduced three fundamental limitations of the EEP, namely (1) the *ambiguity error* (2) the *illegitimacy error* and (3) the *asymmetry error*. Here, we formally define these errors and extend on the *asymmetry error***.**

It may be important to highlight at this point that precedence relations have both an objective and a subjective dimension. The objectivity of precedence relations refers to the fact that the truth of the precedence relation between A and B is independent of the beliefs of observers assigning the precedence relation. The assigning of precedence relations by observers constitutes the subjective dimension. Mismatch between the objective and subjective dimensions constitutes an error in the assignment of the precedence relation.

The ambiguity error, perhaps the most fundamental, refers to the intrinsic uncertainty in assigning precedence relations based on the possibility that the perception of the difficulty of an action as equivalent to another may be an artifact of knowledge limits. If it is erroneously believed that V = W and it is correctly known that W > X, then it may be incorrectly believed that V > X (when in fact X > V). For example, in the discussion of the KLP, the precedence of an ideographic writing system to the English alphabet was correctly established. It was stated, however, that the consideration of Kryptonian as ideographic may be an artifact predicated on knowledge limits. Therefore, there is a possibility that the consideration of Kryptonian as precedent to the English alphabet is erroneous.

The second error termed the illegitimacy error refers to the error of using illegitimate or unreliable actions as the subjects of EEP analysis when a more reliable subject is

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available. The poor choice of subject is influenced by the seeming intellectual sophistication of the subject. For example, in the KLP discussion, EEP analysts bypassed communication content and untenably considered the ETs of superior intelligence based on their use of telepathy (which may very well be a natural attribute). An investigation of communication content would have divulged them to be of inferior intelligence.

The third error termed the asymmetry error is an error in assigning precedence relations because of the fact that it is easier to assign precedence relations between actions precedent to a practiced standard action (which represents the acme of a civilization's technological development) than it is to assign precedence relations between actions that are subsequent. This error stems from lack of knowledge of or the inability to conceptualize the time-evolution of various systems and technology. For example, let us consider the computer as the standard reference. For two actions or technologies precedent to the computer such has the production of fire and the steam engine, the precedence relation fire > steam engine can be established with confidence. However, for two actions succeeding the computer such as the Type I capacity for interstellar travel and the capacity for efficiently and unilaterally locating ET life forms, the precedence relation interstellar travel > efficient and unilateral locating of ET life forms cannot be established with conviction.

The asymmetry error can also refer to the error associated with the asymmetric difficulty of assigning a precedent relation between an arbitrary action V and an established standard action W (objectively precedent to V) compared to assigning a precedence relation between W and X (objectively precedent to W) (this is in fact what the asymmetry error denoted when it was first invoked in the preceding section). Let V, W and X represent the ability to produce a cold fusion reaction, the ability to detect the Higgs boson and the ability to construct a steam engine, respectively. Also, assume cold fusion is possible and let W > V be true. Whereas it is easy to establish X > W, it is harder to establish W > V. Given poor knowledge about and general dismissal of cold fusion, it may be difficult to establish that W > V.

As previously mentioned, the assignment of precedence relations demands a civilization capable of making predictions about future prospects of technology or more accurately the legitimate pathways of technological evolution. It is surmised that the degree of accuracy with which precedence relations may be assigned is proportional to the level of technological development. Moreover, a civilization must meet a threshold of technological development before it can think in terms of predicting technology. Primitive human societies have no knowledge of technological precedence relations (or precedence relations in general) since they do not think in terms of evolution of systems (such as language) or technology extrapolations.

A good example of a contact situation where the idea of precedence relations and the EEP analysis would have been inapplicable (because the aforementioned threshold had not been surpassed) is the episode of Columbus' interaction with the New World. We may simplify history, without much loss of accuracy, by proposing that Columbus came to the New World for gold (or more sensibly that it was his prime motive for colonizing the New World and returning to it twice after his initial accidental discovery). Let the action of searching for gold be the subject of EEP analysis.

From the vantage point of 21st century eyes, the gold-mining fervor divulges that the Europeans had not yet arrived at the technological capacity for cheaply transmuting other metals into gold. However, to the Amerindians who perhaps perceived Columbus and his men as gods possessing advanced technology, the want of gold would not be seen as representing an upper limit to their technological development. The low technological development of the natives precluded them from conceptualizing in terms of precedence relations and EEP analysis. This capacity for the prediction of the time evolution of technology in particular and systems in general is itself advanced technology. It was not only beyond the natives but also beyond Columbus and his men. Humanity seems to have arrived at the threshold only in the second half of the 20th century.

 doi:10.20944/preprints202302.0480.v1

6. Conclusions

The Extraterrestrial Exclusion Principle has been advanced as a fundamental perspective for the strategic resolution of problems related to gauging the level of technological development of extraterrestrials, especially in spite of strategies they may employ to conceal their technological limitations. It serves as a premise on which decisions can be made as far as taking an offensive in the event that these visitors prove belligerent. More fundamentally it provides a framework for the demonstration of extraterrestrials as Type I, where intuition would say otherwise. The interpretation of an ET as Type I, when in fact Type II, is catastrophic.

The Extraterrestrial Exclusion Principle is not stated without its limitations, the most salient of which have been stated explicitly. The many suppositions implicit in this manuscript has not escaped the awareness of the author; they have been tolerated to the extent that they constitute a plausible reality in the many prospective modalities of action that unfold in the universe.

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