A Case in Point: Communication With Unknown Intelligence/s

Tomi S. Melka · Robert M. Schoch

Abstract. This article discusses from a semiotic perspective one important variable—anthropocentrism—present in various proposed messages intended to communicate with off-world intelligences. Our review of different scenarios reveals embedded flaws to various degrees. This should not be a reason for desisting in the pursuit of SETI-style (Search for Extraterrestrial Intelligence) passive "listening" or active "messaging" programs; however, in tandem with such SETI-style programs, a robust and efficient strategy for potential contact should be developed as well. Such a strategy will require adequate time for major structural improvements in both the semiotic and technological realms rather than attempted last-minute adjustments carried out, for instance, when a SETI-style program claims success and contact seems imminent.

The realization that humans often have great difficulties in interpreting their own cultural products and experiences (especially, the long-forgotten ones), as well as the communicative abilities of non-human residents on Earth, is deemed a critical aspect that must be overcome in order to undertake successful hypothetical communication with extraterrestrial intelligences (ETIs). Furthermore, we believe it is pertinent to raise the issue of the modality that any particular ETIs might utilize or recognize as a communication system. Arguably, the widely held assumption (often unstated) that ETIs will recognize and respond positively to either visual or auditory communication (where auditory communication is often encoded in visual graphic forms, such as writing systems), in many cases coded in and transmitted via electromagnetic waves or some other medium, is simply a form of anthropocentrism at a fundamental level.

1. Introduction

Searching for knowledge and reaching new, unknown realms has stood for challenge, scientific adventure, and self-fulfillment in humankind's

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course. As long as the human condition persists, the inner drive of exploration *beyond one more barrier* will continue and possibly grow (cf. Steven J. Dick, in Gardner, 2007, p. 3). Unidentified human events (lost or non-retrieved), non-human data-driven observations, and other scientific phenomena, distant or very distant from our world, have been and still are the focus of attention for scores of researchers. In this context, the probable existence of ETIs and intended inter-communication represents a research area highly subject to philosophical, theological, and epistemological factors. On the other hand, the present controversy surrounding several aspects of this topic cannot eclipse its mid- or long-term significance. The acronym *ETIs* (extra terrestrial intelligences) conveys in what follows a general practical term,[1] and without entering into fine semantic distinctions, it swaps occasionally with *alien/s*. It needs to be clear, at this point, that the following text is not the after-result of the UFO-craze or "watching countless film and television dramas in which creatures from other worlds" (Shostak and Barnett, 2003, p. 1) with oversize brains (or not) engage in massive local / global invasions, fight in space, or show their bizarre manners, clothes, and gadgets. Furthermore, the present authors do not mean to exercise in exotic and cool topics, neither instill tediousness nor ridicule (see also D. G. Brin, 2006).

The idea for the essay emerged from research in symbolic and writing systems and semiotics in general (see Melka, 2008; 2010; 2013; 2017; Melka and Místecký, 2020; Melka and Schoch, 2020; Zörnig and Melka, 2014). A number of obstacles, present during the process of interpretation and deciphering of unknown verbal and/or non-verbal information, certainly raise parallels for the far more complex and difficult task: that of identifying and retrieving messages from non-terrestrial sources. Take just one example, that of the classical script of Rapa Nui (Easter Island)—*rongorongo*. Despite numerous efforts by past and present researchers, the greatest part of its sign-sequences remains impregnable (cf. Vakoch, 2014a, p. xxi), whether in semantic and/or phonetic terms. Upon which, any resilient and open mind might ask: if modern humans do not consistently capture and interpret cogently the information made by an earlier human culture, how can they proceed with truly alien cultures, products of very divergent developmental pathways, and bound (very likely) to unrelated bio-chemical and/or cultural parameters? In a similar vein, Arthur C. Clarke (in *Praise for Lost Languages*, Robinson,

1. For instance, in his Abstract, André Kukla (2001) elaborates the term according to three criteria, "[the] abbreviation 'ETI' [will]… stand for three related concepts: (1) the abstract idea of extraterrestrial intelligence, (2) individuals who are both extraterrestrial and intelligent (as in 'There's an ETI in the closet'), and (3) the hypothesis that there are ETIs". For nuanced definitions and conceptions of extraterrestrial intelligence, see Dunér (2017, pp. 435–437).

2002, dust jacket; Robinson, 2017, p. 209) in commenting about human-made scripts that will probably never be deciphered, pointed out, "if we cannot always understand messages from our fellow humans, how successful will we be when we receive the first communication from Outer Space?"

Given the size and the depth of the subject, our focus here is directed toward a technical aspect of communication with the "unknown": the ingrained human-based semiotics, its outcomes and constraints thereof. The viability of visual and aural codes primarily sent through electromagnetic conduits, and also through other conceivable channels (although to a lesser extent), is examined. In the context of grapholinguistics, we believe it is pertinent to raise the question of whether or not the ETIs we might encounter will necessarily utilize (or recognize) visual and/or auditory communication systems (most human visual graphic communication systems are based on, or encode, auditory communication systems). Whether sent by physical means (such as plaques on spacecraft), broadcast via electromagnetic waves, or conveyed by some other means, will such messages hit or miss the mark? Furthermore, auditory speech in a human sense consists of sequences of sounds over time, with writings and scripts typically "mimicking" such a temporal or linear-like sequence (not just in "straight lines," but also sometimes forming spirals and other shapes). Will the ETIs also communicate using such temporal and linear sequences of "words" or "signs"? Our human inclination toward visual and auditory communication systems arranged in temporal or linear sequences, for the most part, can be viewed as one more instance of anthropocentrism (gestural communication is a form of visual communication), one that occurs at a fundamental level for us, but may not be shared by the ETIs. Even on our planet, non-human species may communicate primarily in other manners and via other modalities, such as by releasing various chemicals that are then detected by the recipients (that is, communication by odors and smells, which are also utilized by humans, but primarily at a more instinctual level, including the use of perfumes as "aphrodisiacs"), by taste, by touch, by body position and orientation (including kinesthetic aspects), and so forth. Be this as it may, given the state of affairs and understanding regarding human communication at this stage in the scholarly literature and the themes of the conference, in this article we necessarily focus on visual and auditory communication systems, even if transmitted through other channels. Of the visual *versus* auditory, some will argue that the visual (such as written sequences and engraved signs) have a much greater chance of surviving over long periods of time as compared to auditory messages, and therefore the visual messages are more likely to be intercepted by the ETIs.

The serious dilemma of whether humans should strictly listen or also transmit at this stage—known as *passive* vs. *active* SETI (Search for

Extraterrestrial Intelligence)[2]—will only be considered briefly here (cf. also D. G. Brin, 2006; Grinspoon, 2007; Musso, 2012, p. 44; Gertz, 2016). Experts in cultural and planetary risk assessment would have a much stronger say in this respect (cf. Tarter, 2000, p. 727; Neal, 2014).

Whether or not the idea of potential life on other relatively well-known celestial bodies (e.g., the Europa and Callisto moons of Jupiter; the Enceladus moon of Saturn) or in farther sectors of space (e.g., twenty, thirty, or more light-years away) is supported in the future, the current analysis will make its point. Details, arguments, and speculations on the prospects of the emergence of non-terrestrial life—simple, complex, intelligent, or sentient—can be consulted in the literature (see Shklovskii and Sagan, 1966; Tipler, 1980; D. G. Brin, 1983; Mayr, 1985; Fogg, 1987; Drake and Sobel, 1992; Dickinson and Schaller, 1994; Heidmann, 1995; Clark, 2000; Aldiss, 2006; Kukla, 2001; Cohen and Stewart, 2002; Webb, 2002; Shostak and Barnett, 2003; Ward, 2005; Davies, 2010; Shuch, 2011; Vakoch, 2014a; Bains and Schulze-Makuch, 2016; Zackrisson et al., 2016; Dunér, 2017; Kipping, 2020; Westby and Conselice, 2020).

While not as expensive as waging long-term wars, attempting to engage with exploration of space and non-terrestrial interlocutors, humanoid or not, is still costly for the finances of the state and its taxpayers given the technological requirements (cf. Matloff, 2005; Benford, Benford, and Benford, 2010; Billingham and Benford, 2011). In addition, such projects are also responsive to the generous donations of wealthy and concerned people (Tarter, 2000, p. 725; Ghosh, 2020).

In the same manner, the predictable or unpredictable ramifications of contact for humanity have been carefully discussed in the literature (cf. Davies, 1995; Kukla, 2001; Cohen and Stewart, 2002; Michaud, 2007; Gardner, 2007; Harrison, 2011; Baum, Haqq-Misra, and Domagal-Goldman, 2011; Vakoch, 2014a, Vakoch, 2014b; Michael, 2014). The *giggle factor* in the popular belief about contacting ETIs, the reigning skepticism in political and/or in certain scientific circles, and the constant financial worries are comprehensible regarding such an ambitious agenda (Tarter, 2000; Michaud, 2007, p. 359; Ćirković, 2013; Ghosh, 2020). Yet, the eagerness to recognize this possible situation implies that scientific and social circles should be better prepared in case it occurs. The axiom "Fortune favors the prepared minds" is most useful today as it was in the past (Michaud, 2007, p. 358, attributes the saying to the French

2. By way of parenthesis, *active* SETI (Search for Extraterrestrial Intelligence) is relative to the search and retrieval of ET messages *versus* METI (Messaging to Extraterrestrial Intelligence), which is concerned with the design and active transmission of messages from our home-world (cf. METI.org, 2020). CETI is another acronym in use that refers to Communication with Extraterrestrial Intelligences (see Westby and Conselice, 2020).

scientist Louis Pasteur). Thus, apart from refining and upgrading the virtue of patience and any subservient technology, the anthropocentric variable(s) favoring (or not) the contact and post-contact situation(s) should be examined.

As answers are sought out, the different scenarios presented below will draw attention to the utter difficulty of the endeavor. Possibilities should not be dismissed, though over-optimism regarding a comprehensive strategy for contact with alien races should be tackled for now with caution and reservation (cf. D. G. Brin, 1983; Billingham and Benford, 2011; Denning, 2014; Wolfram, 2018).

The language of the essay is simple and scientific at the same time. Soaking the readership with technical terminology is avoided, unless the immediate context requires it.

2. Background

During the last two centuries, human scholars have devised strategies regarding how to potentially communicate with the "others" and leave behind the loneliness. The gamut ranges from kerosene-based visual signaling to naturally-developed human languages, mathematical conventions, radio signals, laser beacons, visual-symbolic codes, self-replicating robotic envoys, or to the dispatch of space probes carrying a range of messages and artifacts. The task of mentioning and explaining all of them is demanding and it certainly requires a book-format or a multi-tome edition.

We begin the references with the peculiar proposal of the Austrian astronomer Joseph Johann von Littrow (1781–1840) who considered for some time a method to carry a message to non-terrestrial beings living in the vicinity of our planet. Once some colossal furrows in geometric patterns had been dug out on the Sahara Desert, they had to be filled up with water, plus kerosene atop. The final act was to set in flames the kerosene in an attempt to convey a message to any off-world neighbor or at least to let them know of our existence (cf. Jarrell, 2007).

A number of later attempts and projects are cited in Michaud (2007, pp. 372–373) and Garber (2014, pp. 24–30), among others. The British scientist Francis Galton (1892; see especially Tredoux, 2018, Appendix D) suggested more than a century ago a language composed of "light flashes" in the guise of dots, dashes, and lines, similar to the Morse code, to attract attention from the "Martians". Around the same time (1899), an alternative communication plan—devised by the French amateur astronomer A. Mercier—included several reflectors to be placed on the Eiffel Tower so they could focus the received sunlight (interrupted with a movable screen) towards the targeted planet, Mars (Reddy, 2012, pp. 166–167; Vakoch and Dowd, 2015, p. 215). In 1920, H. W. Nieman

and C. W. Nieman proposed a mathematical approach to building up a common language. Later, in 1952, Lancelot T. Hogben presented the "Astraglossa [= Star Language], or First Steps in Celestial Syntax," based on *number concept* and *knowledge of celestial events*, to be viewed as universal standards. Cocconi and Morrison (1959) suggested in a seminal article the use of radio waves of 21.1 cm for interstellar communication. Hans Freudenthal (1960) proposed "LINCOS," a portmanteau for *Lingua Cosmica*, a complex and dense mathematical-logical code intended to be transmitted via radio signals at different wavelengths.[3] In the same year, Frank D. Drake (1961), then at Cornell University, engaged in *Project Ozma* to possibly detect signals from outer space civilizations nearby the stars *ε Eridani* and *Tau Ceti*. In 1961, another mathematician, Solomon W. Golomb, in a challenging action to prior "cosmic languages" based on terrestrial-like logic, suggested *prime number sequences* or *arithmetic progressions*.

The Polish writer Stanisław Lem (1999, p. 73) names among other projects, LOGLAN (a portmanteau of "logical" and "language") as a possible vehicle for communication due to its inherent features. Vito and Oehrle (1990) rekindled the idea of languages based on science, especially on chemistry. Lemarchand and Lomberg (1996) discuss symmetry properties and aesthetic principles that could offer some communicative advantages when conducting the search in space along a SETI-like program. More recently, Canadian scientists Dutil and Dumas (1999), drawing on Freudenthal's work (1960), developed a language based on a set of symbols, starting from simple concepts and moving on to increasingly complex topics, e.g., the building blocks of life on Earth, the range of human sensitivity to light and sound, the image of the biosphere, including the chemical compositions of the continents, oceans, and atmosphere, etc. The basics of the message were conceived as some kind of cosmic *Rosetta Stone*, to be sent via the Ukrainian radar transmitter at Evpatoria (see Grinspoon, 2007, on *Cosmic Call I* [= CC-1]). G. Matloff (2005), in the spirit of John von Neumann's self-replicating machines (cf. Burks, 1966), investigates the feasibility of deep-space intelligent probes as explorers and messengers to stars. Benford, Benford, and Benford (2010), while analyzing the cost effectiveness, considered the construction of high-power transmitters / beacons by senders and/or receivers as a viable means of communication—intentional or not—and also cosmic areas to focus on and avoid for the transmissions.[4] In turn, SETI scientist Douglas A. Vakoch (2011a) draws on semiotics and suggests iconic and pictorial narratives as a potential means to reach fruition in this sense. Atri, DeMarines, and Haqq-Misra (2011) suggest a

3. Cf. reviews by Hogben (1961) and Blum (1962).

4. See also Lemarchand and Lomberg (1996) regarding a "mutually guessable unique point" along the Milky Way for the communicating parties.

protocol for the construction of an interstellar message in order to maximize the probability that it is understood. The primary factors to be examined are *Signal encoding*; *Message length*; *Information content*; *Anthropocentrism*; *Transmission method*; and *Transmission periodicity*. Echoing Vito and Oehrle (1990), the team Atri, DeMarines, and Haqq-Misra (2011) propose reliance on "a simple physical or mathematical language to communicate both the encoding scheme and the content". In the endeavor of CETI-like projects, Westby and Conselice (2020, p. 17), draw on a very compelling variable, "It is clear that the lifetime of a[n extraterrestrial; *our note*] communicating civilization [= L] is the key aspect within this problem, and very long lifetimes are needed for those within the Galaxy to contain even a few possible active contemporary civilizations"; cf. also M. Shermer's (2002) arguments in this context.

All these efforts show (that) there is an incremental understanding of the cosmos and the existential parameters of life. Yet, the criteria used in devising and classifying the contact channels are generally based so far on (a) the *current* understanding of our—selfish—needs, (b) the *current* understanding of the physics of space, and (c) the *current* understanding of communication (cf. Michaud, 2007, p. 372;[5] Vakoch, 2011b, p. 377; Atri, DeMarines, and Haqq-Misra, 2011; Denning, 2014; Wolfram, 2018; Melka and Místecký, 2020, p. 210; Westby and Conselice, 2020). It seems that there is no definite solution to this, because no perfect and suitable contact *language* for the myriad of circumstances bounding another assumed civilization has been pinpointed or (yet) agreed upon. Although not directly related to the subject matter, Umberto Eco (1997) is worthwhile consulting due to important hints about multiple settings. In this direction, embedding deliberately (or not) features that rely on the human world-vision into these codes is considered to be the primary difficulty.

3. Hello ETI!

The pictorial message (Fig. 1) is actually an icon, not only in scientific circles, but also in the broader popular culture. The idea rests on the assumption that a sufficiently intelligent alien agent, or a civilization for that matter, after leaving behind secrecy (cf. Ball, 1973; Fogg, 1987), would be able to net, deduce, and respond to the arranged graphics displayed on the plaque. At present, it must be assumed that the topology of space-time where recipients are found is similar to Earth's, and most importantly, all the variables in producing intelligent life-forms must be

5. Talking about similar interstellar ventures, Michaud (2007) calls attention to the anthropocentric factor as it may clearly illustrate the dangers of self-interest and "[…] our own cultural assumptions".

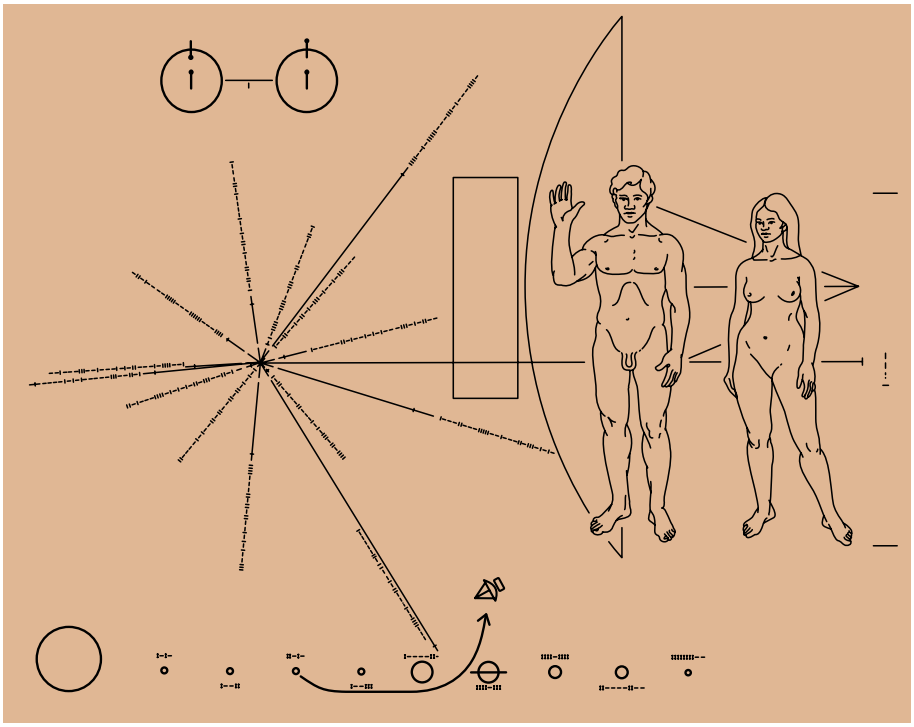

FIGURE 1. The apparently "two-dimensional" message impressed and encoded into the plaque of the *Pioneer 10* space probe of 1972 (cf. Sagan, Sagan, and Drake, 1972, p. 883; Gombrich, 1982, pp. 150–151; Davies, 1995, pp. 55–56; Chandler, 2007, p. 176; BBC, 2010; Rosenthal, 2016; Wolfram, 2018), standing for three-dimensional life-forms, artifacts, atomic, planetary and stellar bodies, was first intended to be intercepted by any *scientifically educated* being in Outer Space. An important and inevitable caveat is that the human-depicted images, objects, and gestures are not only mediated by conventions, but meaning is largely *activated* by cultural convention, as noted in Alex Potts (1996, p. 20). For instance, would the male and female human beings stand better represented in their nudity (critics may perceive some evidence for soft-core pornography), or being properly clothed or half-clothed (critics would disagree on the specific kind of apparel [→ lingerie / bathing suit], as it might be ethnically biased or chosen via personal criteria)? Reprinted after Wikipedia (Vectors by Oona Räisänen (Mysid); designed by Carl Sagan and Frank D. Drake; artwork by Linda Salzman Sagan—Vectorized in CorelDRAW from NASA image GPN-2000-001623.)

assumed, which will develop language(s), communication means, and a keen interest for this purpose (cf. D. G. Brin, 1983; deGrasse Tyson, 2006; Smith, 2009; Głaz, 2014, p. 369).

Nonetheless, a small detour warns specialists that meaning in a linguistic structure is not easy to retrieve even for taggers built by gifted

humans. A sense of disambiguation is required in the syntax of certain phonetic-based utterances, e.g., "You might use all your might" or "May may leave now on leave" (Sproat, 2008, p. 34). Likewise, visually speaking, several human-generated image-constructs, e.g., optical illusions or Rorschach inkblot tests[6] require proper skill, contextualization, relaxation, sobriety, and a fine pair of discerning eyes.

In principle, if meaningful dialogue is sought, the data displayed in Fig. 1 need a priori to be exactly reconstituted by the potential thinking aliens. For all practical purposes, such a reality is far from simple. A number of comments as to the "premature" or the incomplete end of the goal—the transmission of the message pictorially impressed on the plaque of *Pioneer 10* spacecraft and of other memos—are organized below, while referring to Gombrich (1982, pp. 150–151), Chandler (2007, pp. 176–178), Denning (2014), Saint-Gelais (2014), and to the work of social scientists, hard science fiction writers and literary critics,[7] and film producers. As stated earlier, we should *assume* that the astronomical and biological variables—against all odds—favor the creation of reasonably advanced civilizations[8] prepared to receive records from Earth and communicate in an educated manner according to *a mutually acceptable channel* (Golomb, 1961, p. 202). Consider however that without *implicit design coordination* between the transmitter and receiver, the reality of an end-to-end digital interstellar communication system at radio frequencies sounds about *impossible* as noted by Messerschmitt and Morrison (2012). Given that candidates for such an enterprise might theoretically emerge, a number of remarks (bearing some healthy skepticism) are presented.

To start with, Golomb (1963)—in a succinct manner—and later, Jonas and Jonas (1976)—in a more elaborate manner—drew in on mixed arguments which could be condensed to the question: "does the ETI share the same sensory apparatus as we do in order to transcribe and process important (and less important) data?" Some intricate connotations on the *deep and shallow linguistic structure* of the denomination per Noam Chomsky are omitted. ETI tentatively correlates to any life-form with a mixture of a goal-directed movement (inner and/or outer); the capacity of ratiocination (the ability to process external stimuli / data,

6. Human-made *optical illusions* or *Rorschach inkblots* are simply designed to induce an intuitive or eloquent response from their viewers; clearly, they are not intelligent or conscious agents *per se*.

7. For instance, here are worth mentioning Sheila Finch (1986, p. 2), who is among the first science fiction authors, if not the first, to have introduced the term *xenolinguist*, a human expert in extraterrestrial forms of communication, and Adam Głaz's article (2014) on the inherence of linguistics of the "first contact" in fictional works.

8. The terms imply herein a particular form of ET intelligent life, the one capable of technology and willing to communicate; or in the words of Cabrol (2016, p. 663), "As it stands, SETI does not search for all life or for all intelligent life. It focuses exclusively on technologically advanced life".

and postulate inferences from them, mostly critical to survival and thriving) and largely bound (or not) to a special technology for elaboration and enhancement of those data. On the other hand, for those who have the benefit of doubt, it may be similarly asked: "does ratiocination inevitably or even necessarily eventuate as a communication system?" Granted that complex social structures seek cooperation and expansion in material and/or intellectual terms, we may have to accept the possibility that not all non-terrestrial cultures would be xenophobic and isolationist. A major and obvious caveat is that plausible communication is dependent on the prior knowledge of the involved parties. Establishing links with someone or something we have never run across before presents tough challenges. To yield and to paraphrase a science fiction writer, "Man's yardstick is limited to the things he knows about, limited by the circle of his own experiences" (Simak, 1951). Essentially correct—although humans seem to have a natural drive to expand their "circle" in search of deeper and further knowledge, which would comprise the "unconventional" area of interaction with aliens, so to speak. Hence, any experienced researcher is inclined to think that no one can safely teach the craft of an instant and effective communication with the *other*(*s*), especially on a cosmic scale. It can be learned only by constantly doing it and by accepting the repeated failures as part of the process: the concern at this juncture is that *failures* could last dozens of years, if not more. In analogy, our ability to "communicate" at some level with domestic animals—dogs, sheep, goats, cattle, horses, cats, and so on—has required centuries and millennia of mutual interactions and the (genetic) modification of the animals involved. Even communicating with our closest "relatives," the great apes, is no easy nor trivial matter; likewise, understanding great ape gestural communication strategies has required intensive study on the part of humans (Byrne et al., 2017; Fröhlich and Hobaiter, 2018; Tomasello and Call, 2018).

The representational conventions on the above plaque: the physical outfitting of male and female human, the fourteen (14) pulsars of the Milky Way with respect to Sun / Earth, the route-map of our Solar System, the molecular structure of H_2 with its two hydrogen atoms engaged in *hyper-fine transition* (= its two lowest energy states, and related to radio emissions at the wavelength of 21 cm), for all its merit of diagrammatic inception, artistry, and use of binary mathematical language, may reflect anthropocentric bias (cf. Baum, Haqq-Misra, and Domagal-Goldman, 2011; Wolfram, 2018).[9] Terms, such as "anthropocentrism"

9. An independent reviewer noted that "the plaque reflects the style of 1970s America". The original designers of the plaque, Sagan, Sagan, and Drake (1972, p. 881), while acknowledging that "The message inadvertently contains anthropocentric content," expressed also their hope, "Nevertheless we feel that an advanced technical civilization would be able to decipher it."

and "anthropocentric," are essentially employed in this article in the context of the *human-centered cognitive and moral abilities / attitudes*, with *all other beings and whole systems mattering* [only] *for their instrumental value to humans*[10] (for detailed analyses and various positions, refer to Hayward, 1997; Goralnik and Nelson, 2012; Kopnina, Washington, Taylor, and Piccolo, 2018).

Supposing the message[11] makes it through space against all detractors' reasoning and falls in the "hands" of the recipients, the next issue will be *meaning* retrieval. The ETIs will get better estimates of it as long as their biochemistry is / was (quite) similar to the human one and their knowledge of astronomy, physics, chemistry and mathematics are / were substantially close to that of the senders.[12] With enough practice, the decoding *may* or *can* become transparent but the "aliens," to be sure, would need far more samples than the single tablet of *Pioneer 10*. However, there cannot really be much done to correct this now, aside from expanding the sampling in future missions. This option is possible, but experts need to mull over the fact that—*for now*—these are one-way shipments. Even if good luck is on humans' side, given the chances of ET intelligence (see Aldiss, 2006, pp. 33–34, or Webb, 2002) and the literal immensity of space, answers cannot be expected any time soon, and certainly not a successful engagement in a ping pong correspondence (cf. Smith, 2009; Benford, Benford, and Benford, 2010; Shuch, 2011; Vakoch, 2014a; Harbour, 2019; Westby and Conselice, 2020).

An argument as to the validity of the interstellar message construction is to slip back in time and explore real-world human-made symbols, inscriptions, and purported codes. Many scholars have pondered past mysteries and dabbled over the years in archaeological decipherment as well as in cryptanalysis with varied degrees of success (cf. Doblhofer, 1993; Higenbottam, 1973; Pope, 1999; Garrett, 2001; Robinson, 2002; Bauer, 2002). The suggested commonality between the domains of decipherment of ancient scripts / secret codes and that of CETI is not to be viewed as a single, unified approach rather than as *heuristic*, from which some lessons could be learned.

Remember, e.g., some fanciful decipherments of the Cretan *Phaistos Disc* (cf. Fischer, 1997a; Faucounau, 1999; see also Sproat's critique (2007), and Fig. 2), the *only* known "long" document so far with that sort

10. The last statement *in italics* paraphrases the caption of the tag "Anthropocentrism" in Goralnik and Nelson (2012, p. 150, Figure 1).

11. Described as "… the most enterprising and optimistic diagram ever created" in BBC's (2010) documentary.

12. See the (relatively) optimistic view of Fogg (1987, p. 378), "Doubtless, communication between alien races may pose translation problems, but these are unlikely to be insoluble. Although evolved in isolated and unique environments, the same constraints will operate for any intelligence when solving problems".

of "printed" (pressed into the clay) signs, apparently encoding speech patterns. A brief comment here: the original human / alien intention to pass on *information* may ironically result en route in *disinformation*.[13]

Finney and Bentley (2014) raise analogous concerns as they quote the case of the decipherment of Maya glyphs and extrapolate within the broad context of interstellar messages,

> If we have been unable to translate ancient human scripts without some knowledge of the spoken language they represent, what prospects [do] we have of being able to comprehend radio transmissions emanating from other worlds for which we have neither 'Rosetta Stones' nor any knowledge of the languages they encode? (ibid., p. 75)

Regardless of whether or not the unmanned Pioneer 10 spacecraft (together with its message) will ever be recovered by intelligent recipients, the whole concept has to do with its "… largely … symbolic significance" (Davies, 1995, p. 56) in the endeavor of interstellar communication (see also Shostak and Barnett, 2003, pp. 87–137; Frank Drake in BBC's 2010 documentary; Harrison, 2014, pp. 175–176, and Rosenthal, 2016). In a parallel fashion, the apparent disappointment or other concerns related to ETI detection and engagement may still assist humankind "… by enhancing our understanding of how we represent ourselves and how we measure the limits of our self-knowledge" (Denning, 2014, p. 98).

Other graphic examples are found in Fig. 3. As per human standards, the following venture was certainly incepted to let know, and not to entertain nor baffle the ET end-users. The saying "A picture [= image] is worth a thousand words" is truly enlightening, and we admit it is adequate for healthy and knowledgeable humans; but not for the eyes of a giant anteater, a mule, or for a roster of creatures as nearly alien as them.

We would do well to point out that the potential interceptors may have a rough time in interpreting the pictures and numbers of Fig. 3, despite the fact that, as to corpus' criteria, the multiple and enticing nature of the package of 1977 does better than the former *Pioneer 10* plaque (cf. Heidmann, 1993; Harrison, 2014, p. 176). Specifically, Richard Saint-Gelais (2014, p. 93) highlights the importance of the "… number and the variety of messages" sent, which "… will give the recipients more opportunities to compare and test their abductions …"

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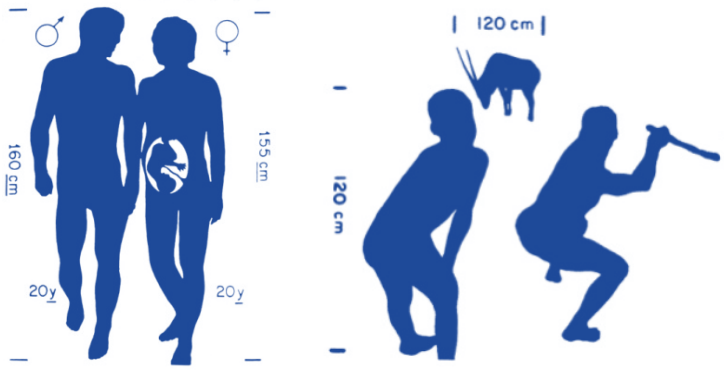
13. Before we get too "excited" about the communication with ETIs, consider that cultural gaffes / misunderstandings are a possibility (at all times); suffice to remember various scenarios in human-to-human interaction(s). The observation is important and, e.g., it comes consequentially to the point when one reads Eric Frank Russell's (1905–1978) story *Allamagoosa* (1955) about data fudging and human failed communication in Outer Space. *Allamagoosa* (a British lexical coinage) stands in the informal US speech for *whatchamacallit* or *thingamajig*.

FIGURE 2. Side B of the so-called *Phaistos Disc* (Wikipedia), a document that is extremely short in texts "written" in similar signs. Given its present status, serious scholarship heavily doubts that it will ever be deciphered (cf. Sproat, 2007). Hypothetically speaking, if ETIs delivered us a moderately short ping, encoded in *Phaistos Disc*'s symbols in order to communicate, it would potentially bring us to a standstill, although it might at least demonstrate that the ETIs are "out there".

However, skeptics might claim that matters are quite complex in terms of elucidation. For instance, although ETIs may stumble across the "Golden Record" and have proper record-playing machines at home, they would have to discern for themselves the meaning of the accompanying indicators, such as "cm" and "*y*," plus the binary sex symbols: "♂" = human male and "♀" = human female. Similarly, whilst deeming the satirical mood of the UK-based anonymous street artist who goes by the name of Banksy (Fig. 4), a few scholars may speculate whether ETIs would have had it easier (or harder) in explaining the image of Fig. 4 when compared with that of Fig. 3b. What becomes clear is that notwithstanding Earth's aspiration for communication, not only isolated human-conceived graphics may result in futile attempts but also arrays of other messages, if contextualization and the attending logical chain are wrong. The supermarket shopping carts on behalf



(a) (b)

FIGURE 3. These silhouetted images are part of the package (= "Golden Record," a phonograph record in a 12-inch gold-plated copper disk) of the *Voyager* space probes 1 and 2 of 1977, including diagrams, pictures and sounds from Earth (Evamy, 2003, pp. 60–61; cf. Shostak and Barnett, 2003, p. 89; Wolfram, 2018; `https://voyager.jpl.nasa.gov/golden-record`).

of wild animals may add at first a harmless little laugh but they still convey the intended irony of the artist to his informed peers. Since "aliens," we assume, will be ignorant of human pre-history, history, modus operandi, local handicrafts, and sense of whimsy, the disjointed and non-interactive data—whether encoding real-life subjects and activities or out-of-place / out-of-time absurd situations—can cripple in advance any interstellar experiment. Vakoch (2000) similarly emphasized that there is no ease at all in interpreting outgoing pictorial messages for extraterrestrial intelligences.

There is a gap of over three decades between *Pioneer 10* space capsule of 1972 / *Voyager* space probes of 1977 and "A Message from Earth," emitted in 2008 from the radar telescope at Evpatoria, Ukraine (Atri, DeMarines, and Haqq-Misra, 2011; Harrison, 2014, p. 181, cf. Zaitsev, 2008a; for prior dispatched transmissions from Evpatoria Planetary Radar [= EPR]; cf. Grinspoon, 2007, and Harrison, 2014, pp. 178–180). Leaving aside the useful debate of whether EPR-messages are technically detectable (or not) by ETIs (Billingham and Benford, 2011), and the redundancy factor (earlier mentioned as *corpus criteria*), the present concern is the quality and cultural neutrality of its contents. Despite the insights collected during the last three decades, the 501 personal letters, photographs, and drawings selected to be transmitted in a digital time capsule, again confirm anthropocentric bias. Thus, instead of being stripped of undue human effusion by enhancing the mixed scientific-symbolic languages, it is held that one actress submitted pictures of opposing political candidates, one to epitomize *good* and the other *evil*

FIGURE 4. *Trolley Hunters*, screen-print by street artist Banksy (2007; see Artificial Gallery, 2006-2010). MAB's (2020) evaluation is, "A biting satire on the inability of modern man to provide for himself ... It depicts three cavemen bearing primitive [= prehistoric; *our note*] weapons and crouched in the act of hunting a herd of supermarket trolleys". And we might add that the trolleys are empty of food.

(Harrison, 2014, p. 181). It may be questioned *how feasible* it would be for complex organisms endowed with intelligence (best-case scenario) or microbial life-forms (worst-case scenario) to comprehend the concepts of "good" and "evil" if a high resolution picture or a video-clip of a king cobra (*Ophiophagus hannah*) and an Indian grey mongoose (*Herpestes edwardsi*) during a fortuitous duel had been included. As a matter of fact, while a mongoose might see a chance for food within the scenario, a cobra exercises the right to self-preservation (see National Geographic, 2010). "Good" vs. "evil" are formal constructions embedded in the moral values of *humanity* (cf., e.g., Goralnik and Nelson, 2012, p. 145), a species very alien both to wild mongooses and king cobras. Some scholars may justifiably wonder what the real aliens (ETIs, for instance) might make of the antagonizing pairs, be those politicians or animal life-forms. On top of that, 21st century Earth scientists are still far away from the achievements of the *Foundation*'s scholar Harri Seldon and followers who used mathematical models for predicting the future behavior of very large groups and the future of history itself, as narrated in the saga of Asimov (1988). If history could be laid in mathematical terms, so could other notions related to morality and raw sentiments.

A complementary source at this point, both in terms of negative or positive outcomes, is Hofstadter in the subsection "Levels of Understanding of a Message",

> Here is where things become very unclear. Will beings of an alien civilization have emotions? will their emotions—supposing they have some—be mappable, in any sense, onto ours? If they do have emotions somewhat like ours, do the emotions cluster together in somewhat the same way as ours do? Will they understand such amalgams as tragic beauty or courageous suffering? If it turns out that beings throughout the universe do share cognitive structures with us to the extent that even emotions overlap, then in some sense, the record [= the message sent; *our note*] can never be out of its natural context; that context is part of the scheme of things, in nature. And if such is the case, then it is likely that a meandering record, if not destroyed en route, would eventually get picked up by a being or group of beings, and get deciphered in a way which we would consider successful. (Hofstadter, 1999, p. 163)

In defense to critical voices, it may be alleged: since other supposedly intelligent beings on Earth, such as dolphins, whales, octopuses, crows, chimpanzees, or orangutans[14] are not keen on building radio-telescopes and space probes, then, the task is left to the *Homo sapiens* breed with all his current baggage of knowledge, preferences, and whims.[15] Furthermore, if most technological civilizations adopt the stance that *listening* is way better than *transmitting* for a bevy of motives, then it is hard indeed to consider a practical interstellar communicating.

However complicated or nearly-impossible the task may be, the message compilers are required in the end to reduce "anthropocentrism" and strike a balance with self-interpreting symbolically- and mathematically-inclined signs, where systematic interplay of repetition and variation between them will give recipients opportunities to make a series of correct conjectures (see Saint-Gelais, 2014, pp. 91–92). At this point, the *Sónar Calling Project* rises to the occasion: during three days in mid-October 2017, several messages were sent from Tromsø (Norway) to the exoplanet GJ273b, located about 12.4 ly away and orbiting Luyten's star (Vakoch, Matessa, DeVito, and Kaiser, 2018). A tutorial—sent in binary code at two frequencies, 929.0 MHz and 930.2 MHz—made use of a minimal number of key mathematical concepts to introduce fundamental physical concepts like time, frequency, and wavelength.[16] Emulating and improving on previous experiments (e.g., *Golden Record*; *Across the Universe* message;[17] *A Message from Earth*), the tutorial comprised also in-

14. Cf. Chick (2014, pp. 211–212), or Herzing (2014).

15. Cf. also Chick (2014, p. 225, footnote 61), Bains and Schulze-Makuch (2016, pp. 17–18) and Cabrol (2016, p. 662); see, however, Raup's (1992, pp. 258–259) exposé on non-conscious alien organisms "who" may have the capability to emit and receive radio (or radar-like) dispatches.

16. In the words of Vakoch, Matessa, DeVito, and Kaiser (2018), "For example, after introducing numbers, basic arithmetic functions, and Pythagorean triples, we describe sine waves through the ratios of sides of a right triangle".

17. The message consisted of the song "Across the Universe" by the Beatles transmitted from Robledo de Chavela, near Madrid (Spain) on February 4, 2008 by NASA

novative features such as a "cosmic clock" to assist extraterrestrials in confirming that their understanding of time from the incoming scientific message maps onto the passage of time they can observe throughout the transmission itself (ibid.). During nearly eight months (October 2017–May 2018), METI International, in collaboration with the Catalonia Institute of Space Studies and Sónar Festival (Barcelona), engaged thirty-five Sónar festival associated musicians (plus three pieces chosen from public submissions) to beam short musical pieces to the exoplanet GJ273b from Tromsø (Norway). The design of the messages had an in-built propaedeutic[18] protocol (= tutorials or progressing explanations of their creative processes). In a parallel fashion, in order to understand Earth's ecosystems, one participant compressed digital audio files and juxtaposed a key to their decoding and reversal of data compression (see `https://www.sonarcalling.com`). The idea of self-teaching tutorials is by all means a strong plus-point; the position of the planet itself is another advantage as it may "heal" somehow the rift of the astronomical distances (i.e., the smallest interaction sender ↔ recipient may take here only 25 ly).[19] On the other hand, the major unknowns in this equation would be: (1) *the presence of intelligent beings living in a favorable bio-habitat*, and (2) *equivalence*, both in terms of their anatomical / neurological systems, and of their receiving antennae and sonic technology (= D/A converters, amplifiers, speakers, etc.). IF (a big one) there is intelligent life on GJ273b whose bio- or synthetic sensors are capable of sweeping correctly the message/s, and IF the extant alien technologies meet "symmetrically" the demands of the "Sónar Calling Project," then, there is a chance the Sónar human messengers did not take a leap in the dark. Yet, if these two isomorphic conditions are not given in the case of planet GJ273b, we have to commend their ingenuity, optimism, and earnest passion in devising the "Sonar Calling Project"—*something of a consolation prize*,[20] nonetheless.

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in the direction of the star Polaris (the *alpha* star in the constellation of *Ursa Minor*), located about 430 ly away from Earth (cf. Zaitsev, 2008b, pp. 1111–1112).

18. From the Greek language, *teaching beforehand*.

19. While mulling over "alien communication" and a shareable "language," Wolfram (2018) suggests, "And in a sense just as we might say that we're only going to consider aliens who live within a certain number of light years of us, so also we may have to say that we'll only consider aliens where the language defining their cultural context is within a certain 'translation distance' of ours"; see, however, Westby and Conselice (2020, p. 16) who estimate that "communicating civilizations in the Galaxy today... would be at a maximum distance given by $17{,}000^{+10{,}000}_{-33{,}600}$ *lt-yr* [= *light years*], making communication or even detection of these systems nearly impossible with present technology".

20. The terms are from Denning (2014, p. 101).

4. Discussion

Since researchers and other concerned groups are sending (or planning to send) improved wording coded after natural and artificial languages, signals, and plain pictures or holograms that (may) contain exposed or half-exposed humans—probably in order to transmit their life-like physiological characteristics—, in the next delivery, it may be tentatively suggested that a picture of a real-life human pair (→ sexually dimorphic) standing on an undisclosed beach be included.

Fair enough… yet, more than one person is tempted to inquire: "what are the chances of "decipherment" by the aliens of the message that encodes the human couple?" For a start, do they stand for a broad category such as "man" and "woman," or do they specifically represent the particular tandem that enjoys meditation and sun-tanning (cf. Chandler, 2007, p. 45), i.e., are they an *icon* or a *symbol* (cf. Vakoch, 1998)? Are they going to be considered copy-cats of their senders: everyone on Earth has by default the same physical characteristics? Would aliens also deem the possibility that the senders invariably *hop around* in a pair-wise or in a symbiotic fashion? Most assuredly, the ETIs are not familiar with the nature of the described phenomenon (that lying on a beach and getting sun-tanned more often than not causes relaxation among humans, especially among those coming from frost-bitten lands); neither are they aware of René Magritte's painting *La Trahison des images* [The Treachery of Images], the affixed text *Ceci n'est pas une pipe* and its connotations (Chandler, 2007, pp. 69–70).

They are likely unaware as well of the habit of wearing bathing suits or of the naturists' cheerful practices of a segment of the human population. To the mind/s of those who decided to include the couple's picture, those are eventually two attractive, thoughtful, and half-dressed young people enjoying a sunbath on unnamed seashores. Yet, to the mind/s of the contacted aliens (presuming somehow that they are *not* post-biological entities), the graphic information will be entirely vague and incoherent. If we exclude somehow details on the human way of life, social organization, genome, morale, technology, communicative systems, etc., apart from astronomical, geological, biological data of our planet,[21] the ETIs would *not* be left any wiser regarding the symbolic

21. See especially Heidmann (1993), who advocated for sending the entire *British Encyclopedia*, a huge buffet of scientific and cultural offerings from Earth. One perceived problem is that humanity speaks a multitude of languages, with the "English Only" probably conveying a skewed picture of the reality of human societies; cf. also Harbour's (2019) opinion, "Encyclopedias vary so widely between countries that no current one could command universal consent—though maybe we could lessen this problem sufficiently by sending abridged encyclopedias in, say, Arabic, Chinese, English, and Hindi, possibly with smaller documents in less widely spoken languages from elsewhere, such as Cherokee and Fijian".

FIGURE 5. The painting *La Trahison des images* [The Treachery of Images] by René Magritte (1898–1967), on display at the Los Angeles County Museum of Art, is reprinted after `https://publicdelivery.org/magritte-not-a-pipe/`. The main goal of human languages is to code and decode meaning and establish communication. In a smart and arbitrary interplay, however, the words (= the written French caption, "This is not a pipe.") betray the represented object, complicating the meaning implied by the author (see in a similar context, Foucault, 1983, pp. 20–22; Vakoch, 1998; Saint-Gelais, 2014, pp. 85–86).

couple and any subtlety around them. Then again, if copious and adequate data are provided and by a clever twist of fate they are decoded, the results may be utilized for malicious ambitions or a possible raid in the not-too-distant future.[22] Some of the informed aliens won't be out there to spread enlightenment or "to save us from our own follies" (Aldiss, 2006, p. 35). In fact, it may be seriously doubted that aliens—once their target is acquired and settled—will show any sense of wonder and awe as to the tandem, as some people on Earth would... *ergo*, in the ETIs' scheme, as if in a renewed pirate episode, Earth might after all be

22. See, e.g., Raybeck (2014, p. 143) who refers to possible "untoward motives" of the ETIs, or Gertz (2016, p. 1), who considers METI-like programs as "unwise... and potentially catastrophic..." since they may lure would-be predatory and dangerous aliens.

a cache to be graciously or rudely exploited, e.g., for servitude, for ultra-rare minerals, for gene harvesting, or in sexual terms. With this hoopla started, they must be taught not only to handle the spotlight well but also how to practice safe sex. Alien viruses or bacteria—incompatible with normal human DNA—probably won't harm Earths' inhabitants but some compatible or freshly engineered alien pathogens may be more annoying and lethal than those already existing on our planet. The point becomes relevant when the "*historic transfer of* [contagious] *diseases to the Americas*" during the *first contact* and *post-first contact* situations with natives by Spanish, Portuguese, Dutch, and English explorers/settlers is considered (see H. F. Dobyns, 1993). Similarly, there could be far worse scenarios where malevolent ETIs could insidiously promote total anarchy and tear apart every inch of the fabric of human society. Notwithstanding current paranoia and sensitivity in equal dosages, the probability of such a perspective should not be neglected by professionals (cf. Tarter, 2000, p. 727; D. G. Brin, 2006; Baum, Haqq-Misra, and Domagal-Goldman, 2011; Musso, 2012; Gertz, 2016).

Bottom-line: this is not a funny story nor banal commentaries, but rather a reflection on the impact and repercussions that Earth-bound visual and other-than-visual messages may cause in an *interstellar contact*, and later in the pursued *exchange protocol*. Earth languages and symbolics have demonstrated on many occasions to be a source of misunderstanding among human individuals. Correspondingly, the *first contact* between human cultures themselves was introduced and followed in the past by military confrontations, skirmishes, and other more-than-disagreeable effects. Many indigenous ethnicities in what are known today as the Americas, Africa, and Oceania, suffered not simply a *cultural shock* but rather an *existential* one when they interacted with the then-Europeans' abusive ways—apparent remorse, positive and gentlemanly dealings, and evaluations took place later or much later (Golomb, 1963, p. 17; Dick, 1996; Harrison, 2011, pp. 72–73; cf. also Michael, 2014 [2011], for pros and cons regarding the post-first contact perspective).

Despite the improvement of technology and a multi-disciplinary approach, thorough changes are hardly expected in the interstellar messaging in the next years. What makes part of scholarship think those ETIs, however *scientifically respectable* they might be (Cohen and Stewart, 2002, p. 4), should be omniscient and get straight the meaning of any Earth-related posting? As it turns out, wishful thinking is not enough along this task of astronomic proportions. Cool scientific reality demands evidence. What SETI-like programs have so far are at best, *sheer statistics on biogenesis*; a *semiotic theory* formulated by humans (which fails to win unanimous support among the humans themselves); a *range of ground- and space-based suitable optical* and *radio-telescopes*; the discovery of thousands of *exoplanets* (circling low-mass M dwarfs and solar-type stars such as our Sun) with different probabilities of sustaining life as we know it; a number of

hard science fiction books about the *radical otherness of* "aliens"; and the heuristic guidance of *Drake's Equation* on the existence of intelligence beyond Earth whose deliberate radio messages are detectable (cf. D. G. Brin, 1983; Dick, 1996; Clark, 2000; deGrasse Tyson, 2006; Cohen and Stewart, 2002, pp. 116–144; Watts, 2006; Shuch, 2011; Gomel, 2014; Cabrol, 2016; Schoch, 2017; `https://exoplanetarchive.ipac.caltech.edu/`; Kipping, 2020; Westby and Conselice, 2020).

The liberty is taken at this time to expand a little more on the subject of Fig. 3, by the same token of Gombrich's (1982) remarks on *Pioneer 10*. A number of premises directly related to the discussion are the default set at this juncture. *First*, it is anticipated that Earth is not an orphan planet. In the vastness of known space,[23] thinking that other planets do not exist (indeed, thousands have been identified)[24] or that properties of life are unreal proves utterly wrong (cf. Clark, 2000; Bertka, 2009). Any Earth chauvinism is liable to end in the same way as the postulations *Earth is flat* or *Earth is the center of the universe*. If such overstatements are played time and again, the British master of comic fantasy, Terry Pratchett, might rise from the after-life and write a new, droll book on the topic. The astrophysicist deGrasse Tyson (2006, p. 16), whilst standing up for *compelling arguments* that *we are not alone*, similarly points out, "To declare that Earth must be the only planet in the universe with life would be inexcusably egocentric of us". *Second*, consider that the cosmos is not human- or communicative-friendly in itself. Beamed signals (of every stripe), automated probes, and/or human beings may degrade there due to various—predictable or unpredictable—factors, as they regularly pass away here on Earth, or as domestic signals corrupt or fade out, again due to several factors. *Third*, it may be assumed that the potential intelligences are multi-cellular (or the extraterrestrial equivalent of multicellular)[25] and engaged in complex, technologically-driven structures and not equivalent to single-celled organisms on Earth. Bigger brainpower requiring physical support from more-than-a-single cell equivalent body appears necessary to process intelligence, at least at a complex level; cf. Bains and Schulze-Makuch (2016). Granted that complex social structures seek cooperation and expansion in material and/or intellec-

23. Max Tegmark (2003, p. 41) comments that the vastness of known space stretches to "about 4×10^{26} meters away—a distance that defines our observable universe...". However, this question cannot be set at rest since "...the observable universe grows by a light-year every year as light from farther away has time to reach us" (ibid.).

24. NASA (`https://exoplanetarchive.ipac.caltech.edu/`) reports more than 4,150 confirmed exoplanets. As recently as April 2020, Vanderburg et al. (2020) rescued from the false positive status another exoplanet.

25. If not so, at the moment of contact humans would require potent magnifying lenses or other instruments, unless aliens socialize in the form of hive-like colonies, a preferred theme as various science fiction works have divulged.

tual terms, we have to accept the possibility that not all non-terrestrial cultures would be xenophobic and/or isolationist. *Fourth*, it is uncertain if the ETIs, in any possible habitat, with a different biochemical metabolism than ours, would find more accessible the included pictures about human reproduction or human predation habits, than, e.g., a message composed in the long-gone Cretan "hieroglyphs" (see Fig. 6), the paradigmatic phrase coined by H. P. Lovecraft (1999, p. 150), "Ph'nglui mglw'nafh Cthulhu R'lyeh wgah'nagl fhtagn" [In his house at R'lyeh dead Cthulhu waits dreaming], or Pythagoras's equation (see Fig. 7). We see no objection to believing that, given these examples, it is not known which would be "weirder" to them, if not perfectly pointless. Perhaps they might have a way of getting along with the *Cthulhu* tongue, virtually unpronounceable to many living humans. Just based on these Voyager-related pictorial samples (Evamy, 2003, pp. 60–61), it would be an astonishing coincidence or a sheer feat, if the printed information was retrieved and correctly interpreted by brute intellectual force. In a similar manner, it should be considered that the *addressees* do not think the Earthmen are purposely deceiving or attacking them by sending messages of this quality. *Fifth*, there might be a particular scenario which cannot be ruled out. If the message is intercepted by a civilization located at the range, say, of 1,200 light years (= ly) away,[26] and an affirmative answer is released, at the time it reaches Earth, some things may have changed. *Why*? Excluding the problem of interpreting ET language/s or symbols, humans will face a home-grown one: the uses and meanings of symbols are not consistent across cultural and time boundaries. Signs may shift in mode over time due, e.g., to further stimuli from the natural environment, technological obsolescence, or from socio-political pressures (cf. Chandler, 2007, p. 45; Fontana, 2003, p. 27). A general pattern is noticed in a given social context: as a culture increases in longevity, there is a tendency to regard the beliefs of previous generations as being *archaic* or *superstitious*. Their symbols are rationalized and sanitized, interpreted literally or simply abandoned altogether by the next cultural elite. Deprived of their context, such symbols diminish in power and have to be rediscovered afresh (Fontana, 2003, p. 28). To sum up, when ETIs' response is ferried back, portions of the cultural message of a *Pioneer 10*-like space probe may need a decipherment by our descendants after some 2,400 years in order to proceed with the exchange. The area of lexicology offers dozens of examples in like

26. In this sense, we should not be oblivious to the fact that part of the METI community is (recently) prioritizing the close stellar neighborhood in order to reduce the time of information-exchange; cf. the messaging projects concerning potentially habitable planets around dwarf star TRAPPIST-1, located thirty nine (39) ly away from Earth (in the constellation Aquarius), see Gillon, Triaud, and Queloz (2017), and the case of the exoplanet GJ372b, circling Luyten's star, at 12.4 ly away from Earth, see Vakoch, Matessa, DeVito, and Kaiser (2018).

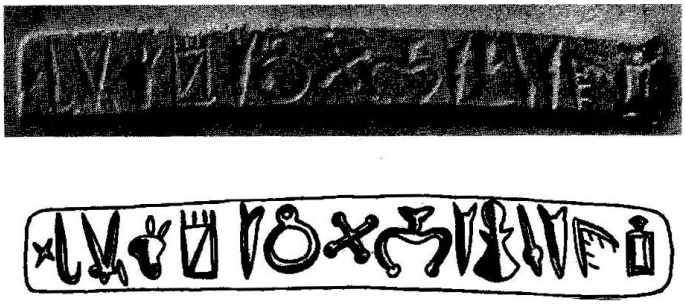
manner, though quoting two would suffice: *flabellum* would not be understandable to many modern humans, without consulting a fine, thick dictionary, or a real specialist in the celebration of the Eucharist (a *flabellum* it is a type of fan used practically to drive away insects, and also has honorific connotations); *dolium* would sound equally unclear given the limits of year 2020 CE. Going back further in time, we learn (that) *dolium* was a Roman earthenware jar for wine, oil, etc. In either case, the terms are not immediately evident on casual reading. Their past or ancient context has dissipated, or may be lost if not refreshed or carefully investigated. Imagine, then, the difficulty in having to carry out a double decipherment: that of the note from the off-world and of our own message. We are at the mercy of probabilistic variables, with no guarantee for a successful solution.

Sixth, by stating all the above, we must consider the theorists' side that endorses poor chances or the utter improbability of communication due to the uncommonness of shared evolutionary traits and/or technologies. It is awkward to perceive matters in absolute terms, as it is awkward to unilaterally perceive them. While agreed that this might be inevitable in certain cases, on the other side, there should be circumstances where joint channels of interaction can be found. The alleged "ETIs" either may be in a bacterial stage (the probability is *very high*; cf. Crawford, 1996), or sporadically in a pre-industrial stage, or even in an industrial or a post-industrial stage. What is feared is that they could belong to an advanced Kardashev *type II* or *III* civilization (cf. Michaud, 2007, p. 36; Wright, Mullan, Sigurðsson, and Povich, 2014, pp. 13–14; Ćirković, 2015), let alone a disturbingly hyper-advanced *type IV* or *V*. We are told that such eventual super-technological civilizations, once they go beyond the self-destruction phase,[27] are dedicated to harness the whole power of a star (→ Type II), of a massive black hole, a galaxy (→ Type III), a string of galaxies, or even of an entire universe (→ Type IV).[28] In weight of numbers, theoretical considerations here go beyond figures of thirty-forty zeroes, if not approaching a googol (or a googolplex). The outlook is daunting and by any present estimate it beats a human understanding. The human motives to communicate perhaps may not really mean much to that civilization (as some aerobic or anaerobic germs may not mean much here on Earth), or vice versa, humans are not going to be able to understand, (or worse) imagine the motives and variables concerning their culture or the universe *en bloc* (see also Ball, 1973).

27. Cf., e.g., Crawford (1996); Westby and Conselice (2020, p. 15).

28. "Type V" is an extremely speculative proposition concerning a *civilization* or *entity* capable of manipulating and harnessing the energy of the multiverse (= the whole known universes).

Is there the possibility of finding "out there" what is already available on Earth? The average alien, comparable to the Earth-based intelligence, "not too dumb and not too smart" (Gardner, 2007, p. 102), with whom scientists have good odds to interact and benefit, may simply *not* exist. It is unlikely that circumstances have been flawlessly "cooked up" to give rise to the sought-for symmetrical intelligence (cf. Musso, 2012, p. 49, for a differing opinion). Yet, in the absence of hard facts, since anything can turn out to be equiprobable, the speculation should be very cautious like in a long *trial-and-error* exercise, where the perceived error should be analyzed and decreased whenever *possible*.



(a)

(b)

FIGURE 6. (a) Segment of Cretan "hieroglyphs" carved in a steatite seal, inventoried as ·294 [3] CR S (4/4) 01 β (Olivier, Godart, and Poursat, 1996, pp. 276–277); (b) the bottom drawing replicates the glyphs, accompanied by nomenclature index numbers

4.1. Further Examples of Designed Communication

Similar concerns to those in Section 3 are correctly paralleled in Shostak and Barnett (2003, p. 153). In an image (ibid., p. 153) intended to convey a three-dimensional (= 3D) environment, a "blue" human being is holding in her/his arms another "red" one. Quibbles aside, we note (a) that

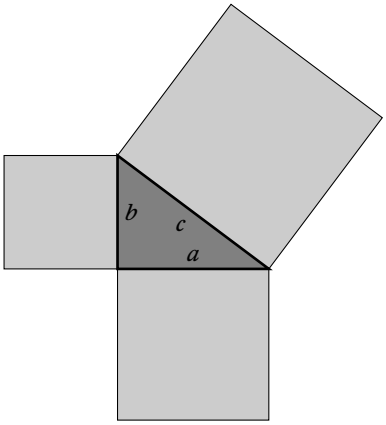


FIGURE 7. Pythagoras's theorem $a^2 + b^2 = c^2$, is well-known for its elegance and simplicity in the mathematical world. Several theorists may think that the formula has a universal application in other bio- and ecosystems of the cosmos. Aldhouse-Green (2004, p. 2) states, "Images contain conceptual messages that may be accepted, negotiated, challenged or denied," which, very aptly, may fit the interstellar negotiations. While this particular case $a^2 + b^2 = c^2$ is viable for intellectual organisms used to the tradition of Earth mathematics and geometric figures, it may not apply to, e.g., intelligences living (or self-exiled) in magnetic fields, who may lack for that matter the Euclidean concepts of linearity or angularity (see, in a broader context, Rescher, 1985; Denning, 2014, pp. 107–108; and Dunér, 2017, pp. 436–437).

a backdrop rectangular grid[29] is chosen on account of a standard human projection of 3D sketches, the idea behind the picture is to show *altruism*—again in keeping with human standards; (b) that these particular body positions are chosen among a myriad of conceivable positions (cf., e.g., Hewes, 1957, on "steady postures"); (c) in the same way, Fernsler (2010, p. 25) in commenting on various factors related to *nonverbal communication* (after Kinsey Goman's book, 2008) highlights *Culture* as a decisive one,

> Not only can gestures mean conflicting things in different cultures but people from various regions of the same country may have quite different body language: Just consider the contrast between the fastpaced, quick-talking New Yorker and the Southerner.

Now, attempting to bridge the cultural, gestural, and linguistic gap among different species is commendable; achieving the goal is another

29. Consider, for a moment, that a few Earth-based "aliens," such as honey bees (*Apis melifera*) or common wasps (*Vespa vulgaris*), are hard-wired to make hexagonal structures in their hives.

matter (cf. Harrison and Elms, 1990; Michaud, 2007). Even if the aliens recognize the message as an intended platform for communication and its physical dimensions, altruism *may be* (or *not*) a noble, traditional norm among them (cf. Vakoch's compilation, 2014b, and Gertz, 2016, for a number of arguments and counter-arguments). Vakoch (2011a) likewise offers a series of pictorial displays which express altruism and reciprocity; cf. Harrison (2011, p. 70). In turn, Cohen and Stewart (2002, p. 300) suggest that *empathy is heavily influenced by culture*, and so could be *altruism* as a synonym to unselfishness. Selfish urges, by analogy, may (or not) prevail among ETIs as a behavioral pattern, though these urges have perhaps a better chance to be (very) active (cf. Brin, 2011), as they may be tied to a universal self-preservation measure / instinct.[30] This will be positively known from empirical observations, which for the moment (year 2020 CE) are wanting.

Stanley Schmidt (1995, pp. 175–176) has an interesting instance from a slightly different context: endeavoring communication with non-human aquatic mammals, dolphins. In his novelette *Pinocchio*, we find tabulated a number of verbal expressions, transcribing the dialogue between the dolphin and researcher.

GOOD MORNING, MASON.		FRIENDLINESS.
	IS THIS SANDY?	MODERATE CHEERFULNESS.
		CURIOSITY.
		EAGERNESS.
		SONAR.

Unconventional as it is, to say the least, it is not quite clear even after the second glimpse. Schmidt offers assistance in this respect: the first two columns of the (computer) display give a very free verbal translation of what he is saying, or both messages if the said things are at once. Some of the sounds carry connotations to compensate for the lack of an expressive face and the third column has the comments on those.

Evidently, *Pinocchio* (= the target dolphin) has earned the right to "speak" his mind; nonetheless, the conversation between dolphins and

30. While theorizing on the appearance of intelligence in potential non-terrestrial habitats, Kukla (2001, p. 41), insinuates indirectly that *altruism* may not be the most noble value among the candidates, "Alternatively, there might be something about evolutionary processes generally that militates against the appearance of more than one intelligent species per planet. (Perhaps intelligence is inevitably accompanied by a xenophobia so intense that the first intelligent species to appear exterminates all the near-intelligent competitors)".

the upstanding researcher/s is not unproblematic. The transcription is amusing once or twice, but if constantly rendered, patience may run out, angst increases, and with it an entropy-dominated model is likely to happen. At this instant, none is to be blamed: the closest thing (we) humans have to communicating like *Pinocchio* would be *nostrils*, functioning single-handedly, in unison, intermittently, or in a shuffled mode. Excluding the nasal sounds, we may not be able to distinctly articulate through the projecting part of the face even a simple phrase such as "Give me a cookie". It is an established fact that *human mammals* have a different anatomy as they have vocal chords, while *dolphin mammals* have nasal air-sacks near the blowhole and they are waterborne creatures. Despite several pesky facts getting in the way of trans-species communication, the basic human desire to fathom other realities, beings, and dimensions cannot be said to be preventable (v. *supra*).

Then… there are people of a different linguistic and social background whose connecting with each other appears next to an *impossible mission*; or if somehow it is accomplished, it touches the realm of absurdity and hilarity (refer below to an excerpt from John Irving's book, 1994, p. 250). It is perhaps no surprise that there are cases of Earth men who have never learned how to talk to women, or Earth women who cannot make (to one extent or another) a rational dialogue with their mother-in-laws. The statement is not meant as a gentle or harsh reproof here; although it echoes fairly well the opening sentence of Saint-Gelais' (2014) essay, "Communication, as we all know, is a touchy business between human beings". Consider in this vein that man-to-man, man-to-woman, and woman-to-woman interactions are—for all their idiosyncrasies, gender, and cultural differences—of the same species, while engaging dolphins is altogether an inter-species model. M. Schetsche (2005) correctly observes,

> Mutual understanding between cultural strangers on Earth is based on anthropocentric constants, which enable us to insinuate that the opposite person has similar physical needs, sensory possibilities, modes of perceiving the world, motivations, etc.

When the scenario is extrapolated to electromagnetic radiation exchanges or to direct contact with ETIs, several scholars begin to approach or realize the strain and imposing complexity of the situation, where human pre-assumptions and stereotypes about the "others" are intrinsically bound.

> Outside a *kaffeehaus* on *Plankengasse*, a man spoke to him. 'Grajak ok bretzet', he seemed to say, and Trumper paused, trying to place this queer language 'Bretzet, jak?' the man said and Trumper thought, Czech? Hungarian? Serbo-Croatian? 'Gra! Nucemo Paz!' the man shouted. He was angry about something and waved his fist at Trumper.

> Bogus [= Trumper; *our note*] asked, 'Ut boethra rast, kelk?' Old Low Norse never hurt a soul.
>
> 'Gra?' the man said suspiciously. 'Grajak, ok,' he added with more confidence. Then he shouted eagerly, 'Nucemo paz tzet!'
>
> Bogus was sorry he didn't understand, and began to say in Old Low Norse: 'Ijs kik…'
>
> 'Kik?' the man interrupted, smiling at Bogus. 'Gra, gra, gra! Kik!' he cried, trying to shake Trumper's hand.
>
> 'Gra, gra, gra! replied Bogus, and shook hands with the man who weaved and mumbled 'Gra, gra'. Nodding with greater conviction than before he tumbled away and stumbled off the kerb, veering across the street stooped over; like a blind man groping for the opposite sidewalk, he aimed his feet and protected his crotch with his hands. (Irving, 1994, p. 250)

A different—or, better, an inverse approach is taken by René Heller (2017). After simulating the receipt of an alien message, the researcher challenged in English via two social networks anyone who could decode it. It should parenthetically be inserted that the author presumed that the altruistic aliens (from a star about 50 ly from Earth) had great scientific abilities and similar logistic resources for the dispatch in question. Consider, however, that the real-life experts might not all and always agree on how best to measure the conditions for sending (or receiving) effectively a transmission that spans across fifty light years.[31]

The message was devised of around 2 million binary digits and comprised a representation of the non-terrestrial being, the first 757 prime numbers (serving as a clue for its decoding) and other concise data related suggestively to the aliens' world, planetary system, and physiology. By using some fundamental natural constants, e.g., *the speed of light*, *the gravitational constant* (= the big G), and *the Planck constant*, the author followed a common trend among many SETI researchers in finding an optimal coding method, independent of human-conceived units (in this sense, see also Denning, 2014, pp. 105–108, for interesting counterarguments).[32] After filtering out misinterpretations and errors (over 300),

---

31. Translated into kilometers the selected distance would be *ca.* 473,040,000,000,000 (= *ca.* four hundred seventy-three trillion forty billion kilometers). If the conception and processing of this digit is somewhat difficult for a normal human brain, we have to contend with celestial bodies that surpass the range 1,000 ly, or more. Such digits, e.g., the 1,000 ly span converted to kilometers, *ca.* 473,040,000,000,000 × 20 = 9,460,800,000,000,000, i.e., *ca.* nine quadrillion four hundred sixty trillion, eight hundred billion kilometers, would probably sound as clear as mud to many of the Earth's inhabitants. Human experts, however, will attach to these astronomical distances, a sense of awe and technological impossibility for the time being.

32. In the light of the mathematical-based concepts embraced (essentially) by astrophysicists, and intended as some "virtual bilingual" in messaging projects, we think Denning (2014) is justified in posing like-minded questions: is the "language of math"

sixty-six submissions (including 71 individuals) were found to be accurate. Since the test was originally devised by a human (cf. Heller, 2017), it could have involved some *mandatory* or *unavoidable perspective* on how to build and broadcast an interstellar message (v. *supra*). In this context, how far short are humans in knowing an extra-terrestrial *modus operandi*, their *ethics*, or *ambassadorship*, it cannot be stated at this time (cf. Michaud, 2007, p. 373; Głaz, 2014), though the plausible answer perhaps is—very short raised to *n*-th power.[33] Yet, we should not agonize over the situation, rather than admit the facts. The plus-side of Heller's effort is that collective intelligence seems to be a key driving force in decoding "unknown" messages or signals. All in all, the missive also reveals or reinforces a few things about human nature, its limitations and hopes in achieving information-bearing exchanges with other technologically capable entities.

Now if scholarship searches for a real-life historical analogue, the first to be highlighted is the narrowband (≤ 10 kHz) radio signal detected on 15 August 1977 by the "Big Ear" radio telescope, at the time operated by Ohio State University as part of the SETI project. Said detection is known as the "*Wow*! Signal," whose discoverer Jerry R. Ehman (one of the project scientists) in analyzing the data on a computer printout, used a red pen to circle the anomaly and wrote next to it "*Wow*!" (Gray and Marvel, 2001, p. 1171; Schoch, 2017). The question is whether the *Wow*! signal had been modulated and varying—as is a standard modern radio signal, so as to encode and broadcast information—, it seems to be possible. The answer, on the other hand, i.e., knowing for certain its possible information-bearing capacity, is out of reach due to the "averaging" of the 1977 equipment over ten-second intervals (ibid.). At this point, whether the *Wow*! signal originated (or not) from a terrestrial source, or whether the generating source was natural or artificial, it is prudent to say that the issue requires further investigation (cf. Gray and Marvel, 2001). If we simply derive from the statistics that thousands of billions of stars make up the Milky Way and other galaxies spread in abundance across portions of the known universe, then it is conceivable that somewhere a planet-bound (or star-bound) mature civilization could have

(commendable as it might be) a universal criterion or a specific human projection in an interstellar decipherment venture? Specifically, whilst it stands true that modern astronomy and physics use Western mathematics, other mathematical systems have existed on Earth, with very different ways of understanding and expressing the world, e.g., Sumerians, Babylonians, Mayans, etc. Simply by learning about (radically) different forms of mathematics here on Earth, we would extend the range of analogies SETI researchers can draw upon, and thus could be of use. It would demonstrate the diverse possibilities for mathematical representation. But if human math and science do not look like extraterrestrial math and science, then the *Rosetta Stone* analogy will not hold up (see ibid.).

33. Cf. the scenario in S. Lem's "first-contact" story *His Master's Voice* (Lem, 1999).

developed the technological means to transmit narrow-bandwidth emissions, producing the *Wow*! signal, or a *Wow*!-like one.

Otherwise, suggestions on receiving other fictitious alien messages have been offered in the not very distant past. Examples would consist of the 1960s television drama "A for Andromeda" written by John Elliott and Fred Hoyle. In that case, radio signals emanating from the Andromeda Galaxy are picked up by the then new radio telescope at Jodrell Bank, near Manchester (Great Britain). The signals included directions for the construction of a computer. This computer enabled the scientists to build a beautiful alien woman—impersonated by Julie Christie in her first appearance on TV screens (see Aldiss, 2006, p. 35; Baxter, 2011, pp. 361–363) [the broadcast was intended for popular consumption]; H. Campaigne (1966), who presented twenty nine (29) radio-messages from "outer space"—the test was limited to a selected audience; Zerwick and Brown (1968) with *The Cassiopeia Affair*, where American radio-astronomers detect a pulsed signal at the hydrogen frequency coming from a star in Cassiopeia 30 ly away (Baxter, 2011, p. 351), and Stanisław Lem's *His Master's Voice* (Lem, 1999), apparently, with a readership unbounded in terms of education, gender, nationality, and cryptoanalytical skills. One alert voice in this connection is Carrigan (2004) who contends that possibly some incoming ETI messages, intentionally or otherwise, may be contaminated (think of the computer viruses).

Clearly, in writing these lines or in quoting sources with a sense of rationality / dry humor, the present authors are not for quitting or "attacking" any project to bridge differences, but rather for adopting any practical and successful strategy based on a cross-disciplinary approach (see, e.g., Ascheri, 2001; Race et al., 2012; Cabrol, 2016). Then again, based on Cocconi and Morrison (1959); Drake (1961), and on earlier suggestions of the 20th century, it becomes apparent that scientific SETI is a recent endeavor (Denning, 2014, p. 95, n. 3; Cabrol, 2016, p. 669; Harbour, 2019). Improved methods and future findings may hold the key to reduce indeterminacy and foster a substantiated contact with ETI. For now, whether passive or active SETI should prevail during the enterprise, we would favor caution. Also, given the status of technological infancy of Earth's various cultures (cf. Carrigan, 2004), "listening" and a "delayed reply" would be preferable (cf. Tarter, 2000, p. 727; Gertz, 2016, p. 10). In this line of argument, we may also refer to Heller and Pudritz (2016, p. 276) who—after inspecting various "… regions of the Milky Way from which extraterrestrials might observe non-grazing transits of Earth in front of the Sun"—point out that "even if our species chose to remain radio-quiet to eschew interstellar contact, we cannot hide from observers located in Earth's solar transit zone, if they exist". We feel confident, however, that Heller and Pudritz's (2016) detectability equation would be feasible, were it not for the still inconclusive major variable "if they exist".

The current sub-section focuses on a domain that teems with aliens and co-related interplay, *science fiction*. Fictional ETIs (credible, trivialized or over-the-top, alive or already dead) are contacted via sundry protocols in many works of the genre, literary or cinematographic (cf. Tenn, 1952; Simak, 1951; Clement, 1954; Lem, 1970; 1999; Sagan, 1985; Crichton, 1987, pp. 27–30; Barlowe, 1987; *The Day the Earth Stood Still*, 1951; *Alien*, 1979; *Stargate*, 1994; *Independence Day*, 1996; *The First Contact* [of the Star Trek yarn], 1996; Watts, 2006; *Avatar*, 2009; Gomel, 2014; Baxter, 2011; 2015).

Such contacts have produced mixed outcomes for the fate of separate individuals or that of humanity, in general. Most certainly, more contacts in the near future may be expected (see Shostak and Barnett, 2003; Watts, 2006). The involved imagination in these pieces has often been wider than the hard scientific approach (cf. Dickinson and Schaller, 1994, p. 13[34]; deGrasse Tyson, 2006, p. 17). Regardless of that, this genre of fiction provides grounds as to plausible extremes anticipated in the outer reaches of space. The SETI Institute, the NASA Astrobiology Institute, the ESA (European Space Agency), or similar campaigning organizations should be far more realistic about the odds of a contact and the subsequent human-ETI course of action thereof. There could be scenarios with plausibly intelligent beings following very distinct evolutionary pathways (see Davies, 1995, pp. 82–83; Ward, 2005), which could produce very different models of understanding and explaining the structure of perceived reality (cf. Lem, 1970). Suffice to say that many of the things (on Earth) do not come on a schedule in everyday life. Consider that even on this planet there have been many manifestations outside the territory of *normal* expectations. Finding a black swan in Australia over three hundred years ago was a real shock because it overturned the paradigm of the white ones (Taleb, 2007). Finding life—without input from photosynthesis—in deep-sea hydrothermal vent systems has profoundly impacted the human view on the geological, geochemical and ecological history of the Earth (Martin, Baross, Kelley, and Russell, 2008, p. 812). More recently, detecting new hardy creatures and species in the abyssal depths or finding extremophile Earth microbes that not only thrive on arsenic—highly toxic by human standards—but rather are "willing" to incorporate it into their genetic code (see Wall, 2010), is quite exciting and makes a good number of scientists feel a bit taken aback.

Researchers, for all practical purposes, should start first examining the Earthly neighborhood and identifying with the *local aliens* (cf. Crichton, 1987, p. 28) through mutually comprehensible channels, before or

34. "Extraterrestrials have been featured in hundreds of Hollywood movies—some good, some bad and some really rotten. From bug-eyed monsters to 'Blob', they come in all shapes and sizes. Entertaining they may be, but believable? Hardly ever" (Dickinson and Schaller, 1994, p. 13).

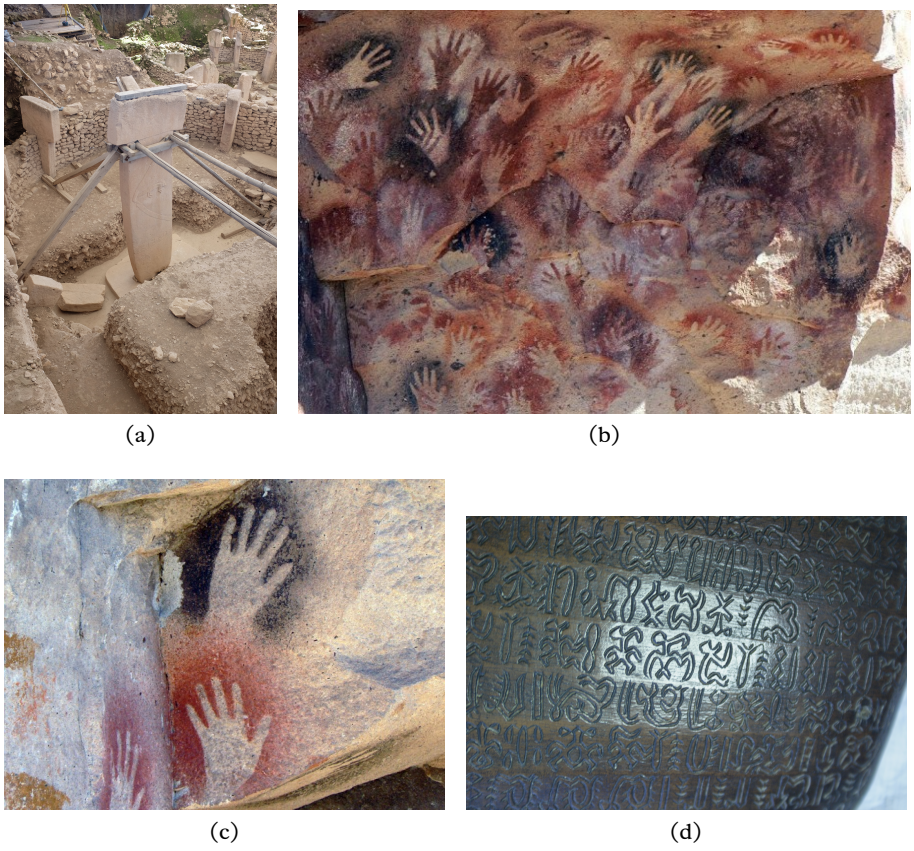
while venturing successful or satisfactory contact elsewhere (cf. Pajmans, 2004; Doyle, McCowan, Johnston, and Hanser, 2011, pp. 408–409; Harrison, 2011, p. 69; Denning, 2014, p. 110; Raybeck, 2014, p. 143; Robinson, 2017, p. 209; Wolfram, 2018). *Local aliens* do not strictly translate into other-than-human living organisms but also into any lost or unsolved cultural trail left by human beings (e.g., the archaeological site of Göbekli Tepe, in Örencik, Şanlıurfa Province, modern Turkey; the *Linear A* markings; several panels of "Cueva de las Manos," located in what is today Province of Santa Cruz, Patagonia, Argentina, featuring stencils of human hands alongside other rock paintings; the classical script—*rongorongo*—of Easter Island, see Figs. 8a, 8b, 8c, and 8d). The accumulated experience will largely assist in grasping the range of parameters that best define the construction of ETI-outbound messages and their decipherability.

5. Conclusions

Caution and fact-based assessments are needed to control any overstretching of arguments. Despite this course of action, a few conclusions may be *somewhat devastating* or *hard to digest*—although *useful*, in the end—for a number of those involved in interstellar or inter-species communication. So far, a rather restricted, anthropocentric idea of communication is available; and up to now the success in contacting ETIs is null. A major issue is that the conception by humans of a cross-species, cross-cultural message (linguistic or not), free of any human-related semiotic trace or perspective—sounds for now as the ultimate oxymoron.[35] All in all, this must not deter the implicated parties by renouncing the endeavor, rather than push them to further improve the "traditional" communicative means and look in the long run for novel semiotic and technological channels (cf., e.g., Cabrol, 2016; Wolfram, 2018).

There is such a lot of nonsense in part of the science fiction literature and in commercial Hollywood-type movies (or not), that many people think that the contacted aliens will verbalize, if not grammatical English, something like (or unlike) English, which will be English after all, once the "universal translators" are turned on or some strange biological / robotic / cyborg-like creatures with impressive translating qualifications are resorted to. Small surprise if critical scholarly voices and/or

35. While we are theoretically in agreement with Cabrol (2016, p. 667), "To find ET, we must expand our minds beyond a deeply rooted Earth-centric perspective and reevaluate concepts that are taken for granted," the question that still remains is: How can we achieve this in the (still) absence of bona fide messages from outer space; alternately, in the absence of a physical encounter between humans and ETIs, or of the detection of alien engineered artifacts / cultural footprints?



(a) (b)

(c) (d)

FIGURE 8. (a) One of the most exemplary "local aliens" awaiting full "decipherment" from human scholars is the ancient site of Göbekli Tepe, located in the southeastern Anatolia region, modern Turkey. The image captures a partial view of the site, specifically the T-shaped "Pillar 18" and the immediate setting. Photograph © Robert M. Schoch (January, 2020). (b) A partial picture from the "Cave of the Hands," province of Santa Cruz, Patagonia, Argentina, shows most of the exterior drenched in "hand" stencils; cf. Melka (2017). Reprinted by permission (© J.A. Acosta Fabio, 2008). (c) Narrowing the specification of the source—"Cave of the Hands," province of Santa Cruz, Patagonia, Argentina—"hand" motifs are observed to occur on any planar surface; cf. Melka (2017). Reprinted by permission (© J.A. Acosta Fabio, 2008). (d) The classical *rongorongo* script coming from Rapa Nui (Easter Island) has defied a cogent interpretation / decipherment since its documented discovery in 1864. The present is a partial image of the back side (= *verso*) of tablet "Aruku Kurenga," one of the few original items preserved in a remarkably fine state; cf. Melka (2017). The complete text runs to about 1,290 glyphic elements (Barthel, 1958, p. 16; Fischer, 1997b, p. 427; Orliac and Orliac, 2008, p. 253), with the average height size between ten to *ca.* twelve mm and the tablet-weight consisting of 626 grams (Orliac and Orliac, 2008). The © photograph was taken by M. Harris (2009) at the General Archives of the Padri dei Sacri Cuori (SSCC), Rome, Italy.

standing jokes gain acceptance among the academic and popular circles regarding such stereotypes (see Fig. 9).

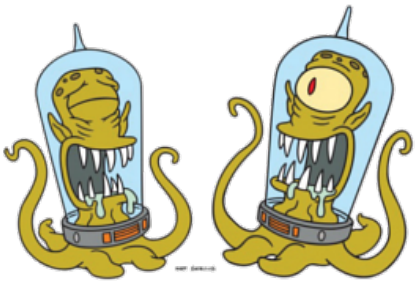


FIGURE 9. A screenshot of the alien duo Kang and Kodos from planet Rigel VII featured in a number of episodes of *The Simpsons* TV series (Wikipedia, 2020). The producers of the show have agreed to take / treat the characters humorously and illustrate the point that Rigellian (the alien language from planet Rigel VII), by an astonishing coincidence, is identical to English (cf. Johnson, 2020).

Similarly, it is unknown whether humans will meet safe, cuddly, well-intentioned, or predictable living things out there—however, we do not think trained experts anticipate this to be the case all across the explored space. It is, likewise, unknown if ETIs will be amoral, callous, resenting, obnoxious, and invasive in proportion to what are understood as civilized standards. *Intelligence* and *morality* have produced—over the centuries—benevolent as well as nasty and flawed results here on Earth, too. The present human values *simply* are not and cannot be universal, unless projected or imposed in whatever domain to be prospected and taken possession of (cf. Gorman, 2009).

When *communication* with ETIs is mentioned or envisioned, scientists should come to grips with the human constraints with respect to the many nuances and implications of this very concept. Additional research and progress in space exploration and technological media will be a bonus. Two additional frameworks that merit further serious analysis are semiotics / linguistics and cognitive psychology, given their potential to loosen and minimize the anthropocentric measure. In the light of the premises, it would be better, even nearly-optimal, to get to know ETIs, their socio-ethical values or artifacts in first person, their home-world, colonized outposts, or previously visited cosmic bodies—if not fully, then parts or relics of their existence—(cf. also Davies, 2012; Wright, Mullan, Sigurðsson, and Povich, 2014; Cabrol, 2016, Wolfram,

2018).[36] Unless sheer serendipity or some unanticipated circumstances favor these scenarios, the more realistic and somewhat less expensive way in 2020 would be upgraded, repeated radio-signaling, laser beaconing,[37] and interlocution via the principle of *inverse cryptography*, via *self-interpreting messages*, or *messages with … anti cryptographic properties in mind* (Callimahos, 1966, p. 83;[38] Dixon, 1973; Lemarchand and Lomberg, 1996; Benford, Benford, and Benford, 2010; Billingham and Benford, 2011; Atri, DeMarines, and Haqq-Misra, 2011; Denning, 2014, p. 102; Saint-Gelais, 2014, p. 89; Vakoch, Matessa, DeVito, and Kaiser, 2018; Harbour, 2019; `https://www.sonarcalling.com`). Otherwise, matters are still bound to be rated as *intellectual distraction*—valuable and delightful as it eventually might be—or soft *science fiction*.

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36. Wolfram (2018) looks at the problem in a "different" light: his prospectus for the "beacon project" suggests the deployment of "Earth" beacons (= cultural · technological artifacts / human-related expressions) that may be recognizable and understandable by ETIs as artificially made. We have to point out that the author (2018) also admits the "complicated intellectual and philosophical issues" regarding this undertaking.

37. Given that Earth technology makes a significant breakthrough in the future in self-replicating traveling probes / nanobots, our "bet" is that these emissaries would prove more efficient in detecting and/or contacting biological (or not) life-forms in other parts of the known space.

38. In the words of the author, "A communication specially designed, not to hide meaning, but to be as easy as possible to comprehend".

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