

The meaning and challenge of the quest for extraterrestrials

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Abstract

Today, human beings are venturing into deep space. As questioning beings who continuously seek to transcend ourselves, and as the scientific quest for extraterrestrials continues, we are prompted to philosophise about extraterrestrials in the event of detection. The search for extraterrestrials is also a search for ourselves. What is it to be human? This question is highlighted in arguments for and against this quest and in the discussion about communication with extraterrestrials.

Constraints and convergence in our evolutionary context and a galaxy with so many similarities make a too different alien science unlikely. Aliens cannot be too alien. Strict protocols are in place before sightings can be confirmed. Some results seem very promising, others not. The detection of cosmic companions in our galaxy will bring humans together like never before.

Introduction

This article examines the philosophical meaning and the challenge of the quest for extraterrestrials. Extraterrestrial biological life is interpreted as a necessary condition for the main focus, namely, extraterrestrial intelligence and the possibility of communication with extraterrestrials. Although there are as yet no final proofs of the existence of extraterrestrials, there are strong empirical and logical grounds for claiming their existence. The quest for extraterrestrials (from now on called "the quest") was and still continues in the work of the billion dollar astrobiological and SETI projects of NASA, universities, the SETI Institute and the SETI League. These institutions are all solidly scientific institutions, which means that we are now far removed from the speculative stance of the past.

Philosophy is an argumentative, interpretative and critical discipline. More specifically, the quest involves the philosophy of science and mind. Philosophy is not an empirical science like astronomy; it does not experimentally confirm claims, but it does make use of the evidence, findings and thinking of other sciences. Being rational and argumentative, philosophy

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does not itself prove things empirically, but makes many things more plausible. It comes to completely new conclusions – including new in the sense of reinterpreting what was said before in a new way. This article will utilise a combination of aspects of functionalism, keeping the thought of John Searle on mind. Much has been said before on functionalism and philosophy of mind. However, in this context, to date, extraterrestrials have only been (barely) mentioned or touched upon in passing. Communication with extraterrestrials has, however, received more attention in various disciplines like astronomy and cosmology

The article's basic supposition is the theory of evolution. It will be argued that the theory of evolution makes sense of the existence of extraterrestrials. Extraterrestrials (when their existence is finally confirmed) and humans share the same universe, same chemistry, and same physical laws. The article philosophically examines the issue of how and if communication between extraterrestrials and *Homo sapiens* will be possible. Arguments for and against such possibility are critically discussed and conclusions drawn. Physiological, anatomical and environmental differences will impact on communication, but constraints in an evolutionary context will necessarily imply similarities. The quest is a challenge, because it means that human transcendence is venturing into something radically new.

In this article, I shall not be discussing claims about UFO visitations. Unless conclusive evidence can come forth which will imply that aliens have succeeded in devising technology that enables them to travel faster than the speed of light, such claims will not be regarded as based on scientific knowledge. The quest involves serious and solid science. Radio transmissions and eventual communication from alien technological civilisations elsewhere in our galaxy would be able to travel at the speed of light. The current astrobiological and SETI projects can be rationally justified.

The confirmation and detection of extraterrestrials will be humankind's greatest challenge, in science but especially in philosophy and theology. These two disciplines have encountered many and sometimes radical challenges during the course of human history. Some of these challenges include the Copernican revolution, and the theories of evolution, relativity and quantum physics. The impact of detection will be comparable to the impact on the Neanderthals when, for the first time, they met another human species, *Homo sapiens*. To claim that this encounter was radical and a true cultural shock is more than reasonable. The impact on and challenge to humankind after announcing the confirmed detection of alien civilisations elsewhere in our galaxy, the Milky Way, will, of course, be more radical.

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Why the quest? Transcendence

Except for a number of what one might call scientific “side effects”, billions of dollars have been and are being spent on the quest without, to date, any definite concrete advantage in sight. Yet the quest continues, using ever better and improved technology. This is why I can claim that, behind this quest, lies human transcendence and sheer human curiosity. Critics of the quest frequently claim that the quest can be dismissed as mere speculation or worse: some sceptics claim that it is little more than a continuation of belief in the gods of the past – such as Zeus, Persephone, Apollo, or Demeter. These same sceptics say that these gods have now merely been replaced by new surrogates, namely, extraterrestrials.

The existence of extraterrestrials has not yet finally been confirmed. It is largely a venture into the unknown. Given this, why this curiosity, this multimillion-dollar quest for extraterrestrials? I think the answer lays in the fact of something more philosophical – human transcendence. As self-transcending beings, we are ineluctably bound to keep shifting the frontiers of transcendence, and at the same time we cannot exist without them:

At most, transcendence is reinterpreted to conform to our most recent experience and interpretation of it. In other words what characterises people; as transcending beings is not just their belief in the existence of an absolutely transcendent God; transcendence is integral to their being ... So while it seems that transcendence can be ‘domesticated’ and secularised, it cannot be eliminated without radically changing human nature ... Probably a new cosmology (new perception of space and time), new biological, cognitive and brain sciences, as well as new philosophical ideas did most to change our concept of transcendence (Du Toit 2010:1).

Has anything shifted the frontiers of transcendence more than this quest to find an answer to the question: are we alone in the galaxy? The answer lies ahead in the future. The fulfilment of meaning lies in the future (Löwith 1961). The quest is likewise a will to meaning.

In his work on humanity’s status in the cosmos, Scheler – although he has not, as yet, reflected on SETI, sees in humankind a search for meaning, because this search for meaning is an existential method that loosens human beings from their organic boundedness; humans have freedom, which means that their *Dasein* is world excentric (Scheler 1949). “Patterns, meaning, structure are metaphorically ascribed to the world so it can make sense to us. Human thought is always a movement of the will to meaning” (Du Toit 2010:133).

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NASA's rover craft *Curiosity* landed on Mars on August 6, 2012. The name *Curiosity* already tells us something about transcendence, astonishment and wonder. Old questions, such as: why is there something rather than nothing are asked in a new way: what is it to be human? Are we alone in our galaxy? We are questioning beings, directed to the world, to our *mitwelt* and *umwelt*, turning to others with questions, questioning ourselves, and being questioned by others (Straus 1960).

Philosopher Karl Jaspers, while also not considering the possibility of extraterrestrials, in principle opened the way for the quest: he saw transcendence in science and claimed that science is always, in principle, incomplete.

Science advances without limits. Modern science is motivated by the ardent desire to reach the limits, break through all definitive forms of knowledge, ever and again to revise all knowledge, from its very foundations. Hence the sudden reversals that take place at every breakthrough, accompanied by the preservations of factual acquisitions as an element in the new interpretation. . Everything is there to be overcome (for the presuppositions are explained in terms of more comprehensive presuppositions and so relativised); when it is facts that are involved they are used as a means to further advances in the continuity of increasing and more penetrating knowledge (Jaspers 1953:83).

These words apply directly to the quest. Jaspers would not have agreed with the view that the quest is too radical to contemplate. On the contrary:

.... *Nothing is indifferent* to modern science: it considers everything worth knowing and directs its attention to the smallest and most individual phenomenon, to every fact as such. ...The self-surrender to every object, to chance, to the misshapen equally with the well shaped, has its roots in an all-embracing self-consciousness that is both restless and sure of itself. Everything that is must and shall be known. Nothing may be left out of consideration (Jaspers 1953: 85).

Knowledge is always incomplete; it is never secluded and, in the knowing structure, lies the demand for continuous progress. Neither is knowledge closed within a moment, and neither is it timeless – otherwise it would no longer be knowledge (Van Peursen, mcmlxviii). 1968)

With the quest the following becomes very clear: we not only 'erect' frontiers, but also cross them and shift them to accord with the insights and

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challenges of our age – after all, new frontiers keep materialising (Du Toit 2010). It is human nature's continuous strive to go for that which presents itself as still unachieved – our wishes are always higher than what has been achieved to date (Jaspers 1953).

This is not noumenal transcendence, but an immanent, this worldly transcendence experienced as an event: “Wherever we locate the frontier of transcendence it remains thoroughly human, whether we wrap it in metaphors, apophatic theologies, metaphysical experience or quantum uncertainty” (Du Toit 2010:19). One can add: or wrap it in the frontiers of the quest. “Transcendence in the sense of a movement towards some other reality, the dawn of the unexpected and the unforeseeable, is a hallmark of human experience of space and time, of human language and consciousness, of human self-experience and history” (Du Toit 2010:132).

Some relevant background for the main argument

Although space does not allow us to touch on everything that is relevant to the argument here, I have considered the following three factors in my development of the main argument for the existence of and communication with extraterrestrials. These are: *Curiosity*'s discovery on Mars, exoplanets, and SETI.

It is now known that our galaxy, and even the universe, share the same chemistry and the same laws of physics (e.g. gravity). It is on these grounds that I argue that the necessary conditions for life to evolve would also be very similar elsewhere in the universe. Even though causality operates in the same way everywhere, it does not follow, of course, that evolved life forms will be exactly the same. This is due to the many causal contingent factors that may have an impact on a large variety of planets. Is there evidence for the existence of a habitat for life, which is a necessary condition for organisms and intelligent life?

NASA's Curiosity craft

Confirmation that such a necessary habitat does exist came on March 2013, when NASA's craft on Mars, *Curiosity*, did rotary percussion drilling from February 8 2013 in the *John Klein Rock* on a shallow depression or basin called *Yellow Knife Bay* (not a bay with real water) (Kremer 2013, March 12). The results of this drilling achieved the goal of discovering a habitable environment on Mars; It confirmed that such a habitat had existed in the past. Not only did NASA find clay – rich layered sediments which showed a clear analogy to clay bearing lake sediments on Earth, but found that these clay minerals could form only in neutral water favourable to the formation of life which could have thrived on Mars (Ibid). Remnants of organisms (or still

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living ones) have not yet been found, but the discovery of the habitat means that the future discovery of such organisms is a very real possibility. It further legitimises the quest.

This discovery constitutes a basis for and a legitimising of the quest: The finding of real microbes, organisms or remnants of these organisms is now no longer based on mere speculation, but is a very real possibility.

Search for Extraterrestrial Intelligence (SETI)

One estimate is that there exists somewhere between one thousand and one hundred million advanced extraterrestrial civilisations in the Milky Way (Drake & Sobel 1993:62); other scientists claim that life in the universe is abundant (Sagan & Newman 1987) and that such a claim is rational. Furthermore, according to Beck (1987) we, as creatures of a young technological civilisation, must expect most other civilisations with which we establish contact to be much older, to be technologically more advanced, and socially perhaps more stable than we are. This is SETI's *quaestio juris*. However, this stance must be supported by evidence.

To do just that, SETI is presently being undertaken using radio telescope and laser. A reasonable question will be: Has evidence of signals emanating from extraterrestrial civilizations so far been found? As far as evidence is concerned, have signals from extraterrestrial civilisations been detected to date? I would claim: yes and no. The official SETI view is "no". This is because the SETI community has very strict protocols relating to the detection of alien signals, protocols that are embodied in the *Rio Scale*. Terrestrial interference signals and natural radio signals are present in abundance and are received regularly. However, any artificially generated radio signal from deep space (implying an extraterrestrial origin) can also be detected with great certainty. They differ qualitatively from natural signals. As to my "yes and no", the following is relevant:

On 15 August 1977, Ohio State University Radio Telescope, the so-called Big Ear detected the presence of an unusual signal coming from the direction of the constellation of Sagittarius (Anderson 2012). The astronomer on duty at the time, Jerry Ehman, was so surprised that he scrawled "Wow!" on the computer output. The signal, a very strong transmission of 72 seconds, was completely consistent with all the strict criteria needed to confirm the presence of an artificial signal emanating from a non-terrestrial transmitting source. This radio signal was heard on only one frequency (a natural signal would be heard on all the 50 channels). The channel was narrow and focussed, as would be expected from an artificial source. The "wow!" signal was observed in the MHz frequency, a protected spectrum reserved for astronomical purposes in which terrestrial transmitters are forbidden to transmit (Anderson 2012). The only thing that "counted against"

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being finally regarded as an artificial alien signal was a scientific requirement – it did not repeat itself. This remains true, despite several subsequent searches that have continued up to and including today. Why did the signal not repeat? The “wow!” signal may have emanated from something like beacons sent out by aliens intentionally but only on a periodic basis. Such a periodic signal could be missed completely or appear only after a very long time (Anderson 2012). Furthermore, I would argue that this signal may have been the result of some unknown, but natural (i.e. non-alien) cause. But does this invalidate the possibility of an alien origin? Not necessarily. We thus cautiously and provisionally can claim the “wow!-signal” to be of alien origin.

Very recently (2012, 2013), SETI searches have been directed to certain Kepler planets. Even though not yet confirmed and many observations are still to be made, some signals emanating from the direct of these planets suggest an artificial origin. Furthermore, some candidate alien signals were detected by SETI’s radio telescope at the University of California, Berkeley. These signals emanated from Kepler planets KOI817 and KOI812. Like the “wow!” signal, these signals strongly suggest an artificial origin because they also share certain characteristics that one would expect of artificial signals (Muracco 2012).

Exoplanets

The existence of planets in other planetary systems beyond our own (exoplanets) used to be regarded as far-fetched or simply fantasy. The reason: it was too radical a suggestion to be taken seriously. Also, telescopes in use at the time could not detect such planets. This led to the hasty conclusion that such planets did not exist. Sagan’s dictum: “Absence of evidence is no evidence of absence” is appropriate. In philosophical terms, this is the fallacy of *argumentum ad ignorantiam*. This view has now changed dramatically. The first exoplanets were discovered in 1995. (For many years, science fiction had stories about extraterrestrial beings living on a planet from Alpha Centauri, e.g. there is Mary Orla Russell’s story of *The spawn* and Arthur Clarke’s *The songs of distant earths*.) What had been fiction was now fact. On 16 October 2012, the Southern Observatory announced that a planet had been discovered in the Alpha Centauri System – the nearest extrasolar system to Earth – only 4.3 light years away (Nowitz 2012). Since then, about 1,000 exoplanets have been detected with many more candidates (2,740) awaiting confirmation.

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Critical reflection

Some biologists are sceptical about the evolution of extraterrestrial life and intelligence, let alone the possibility of communication with them. Others disagree and argue that it is not only possible, but also very likely. I note that both sides argue from the same premise of evolution, but draw different conclusions from this premise. Both employ the causal principle. Philosophically, this implies the concept of the *underdetermination of scientific knowledge and theories*. Unlike mathematics, where conclusions can be proved exactly and univocally, empirical science, although also exact, is not exact in the same sense that mathematics is exact. The moment that the concrete and the empirical enters into the equation, things change. Pine (2004) is right that scientific knowledge can and ought to be reliable. However, there are in principle always more variables which can enter into the equation that need to be controlled. A finding or theory is never finally controlled or conclusive as it is in mathematics. The number of variables is infinite; a confirmed theory can never be known to be true beyond any logical conceivable doubt. We can, however, claim that some beliefs are better supported than others, and a belief becomes a reliable belief if evidence in its favour is overwhelming (Pine 2004). This explains why underdetermination of scientific theories can and does occur. Often (but not always) more than one theory, explanation or law are logically equivalent, which means that all are compatible with the evidence: “Data underdetermine the correct theory when the data are insufficient to determine which of several theories is true” (Ladyman 2006:62). All theories were once hypotheses, and there are weak and strong forms of underdetermination. Data that are increasingly more precise may solve a problem of a theory being weakly underdeterminate. Let us then look at two examples of opposing conclusions.

Biologists Mayr and Dobzhansky appeal to the evidence of evolution to draw the conclusion that life could only have evolved on Earth. The evolving of extraterrestrial life is highly unlikely. There are too many unpredictable events in the evolution of the human condition for the process to be repeated in different and independent biological systems elsewhere in our galaxy (Raup 1987). For Mayr the chances for the occurrence of this rather unique event several times, namely the origin of life, is an improbable event – the event is exceedingly small – no matter how many millions of planets there are in the universe (Dick 2001). However, “highly unlikely” does not mean “ruled out”: Mayr, adopting a philosophy of science approach, says: “I do not make such a claim, (that extra-terrestrials do not exist), and it would not be science if I did, since it would be impossible to ever refute it” (Mayr 1987:24). However, the converse for him is also valid: claims that extraterrestrials do exist can equally not be refuted (Raup 1987). He further argues that those biologists (like himself) who doubt the probability of ever

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establishing contact with extraterrestrial intelligent life if it should exist do not deny categorically the possibility of extraterrestrial intelligence, as they have been accused of doing. “How could they? “There are no facts that would permit such a categorical denial … All they claim is that probabilities are close to zero” (Mayr 1987:29). If the evolution of biological life elsewhere is unlikely, even more so the evolution of intelligence. The main reason for adopting this view, as far as Mayr is concerned, is that evolution is blind: there is no set straight line from the origin of life to the emerging of genuine intelligence – it is an incredible extraordinary improbability (Mayr 1987). Even the fact of evolutionary *convergence* does not deter Mayr from his negative conclusion about the evolution of extraterrestrial intelligence. For Mayr, therefore, the quest is a waste of taxpayers’ money.

Noble prize winning biologist Francis Crick, astronomer Donald Menzel and philosopher Michael Ruse appeal to the same theory of evolution but arrive at different, opposite conclusions. For Menzel (1965), the evolution of extraterrestrials is not only possible, but even inevitable. Indeed, Menzel makes a very strong claim for the existence of extraterrestrial intelligence: if life originated, it would inevitably lead to intelligent life and, as the end product of a chemical reaction chain where the end product can be predicted once you know with what chemicals you have started from – in due time it will give rise to extra-terrestrial intelligence. There are millions of planets all inhabited by intelligent life. Agreeing with this line of thinking, Nobel Prize winner, De Duve even calls this a cosmic imperative (Davies 2010). This means that the origin of life on Earth was not a happy accident, but a normal evolutionary process following chemical evolution (Oparin, in Dick 2001). If this is the case, this makes *Curiosity*’s findings even more significant.

I argue that invariant causality does not necessary imply causal-determinism:

Physics today is not operating with a causal-deterministic system of the universe in the classical Laplacean sense where all correlations are logically equivalent and symmetrical. Furthermore, not all processes described by physics are causally linear. Chaos-complexity theory, which today is serious science, describes nonlinear systems where spontaneous self-organisation occurs and the whole could be more than the parts. This is neither classical metaphysics, nor causal – determinism, which comes into play at all with the theory of evolution. If so, there is another reason why both Mayr and others’ stance hardly rules out the occurrence of extra-terrestrial life and intelligence (Antonites 2010:493, 494). If so, there is no

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good reason for Mayr and others to rule out the occurrence of extra-terrestrial life and intelligence.

On these grounds, one could claim: evolution does follow a normal line. Because we do not have a causal deterministic universe, some lines of development can be predicted. This is what Menzel's argument implies: evolution would inevitably lead to intelligent life as the end product of a chemical chain reaction. This does not annul the view that, unlike in chemistry and physics, predictions about all outcomes cannot be predicted. Nor does it imply intrinsic goals or ends in evolution. I argue that there is a difference between a designed goal and direction in biological processes. Evolution does not operate with plans, goals or ends. However, I argue that there is a good measure of constraints and inevitability in the evolutionary process. Convergence in evolution is a good example (see later). Good adaptations are repeated by evolution, and the same is true of the emergence of consciousness and intelligence.

On the one hand, then, evolution is too complex for the sort of predictions that are made in physics. On the other hand, there are certain constraints and regularities in evolution in the sense implied by Menzel.

The Noble Prize winner and scientist of evolutionary biology, who was originally a physicist, Sir Francis Crick, also argues for the evolution of life elsewhere in our galaxy as something inevitable once evolution has begun. His argument is slightly different from that of Menzel's. Crick addresses the difference between physics and biology – even more so than Mayr. Starting from the same premise of evolution and causality, he comes to different conclusions from Mayr. In biology, according to Crick, regularities do occur but they are not the same as deterministic causal laws (Crick 1988). Crick not only justifies claims for the evolution and actual existence of extra-terrestrial intelligence, but was himself actively engaged in SETI. He further proposes the hypothesis of directed (by extra-terrestrial civilisations) panspermia.

However, even though the scientists discussed above have made profitable use of evolution, there is still a challenge to be faced. The philosopher Lamb (2001) claims that we have an explanatory problem here, namely, that there is still no well-established theoretical explanation for the transformation of complex organic molecules to simple living systems (e.g. from biochemistry to biology). This is indeed the case. However, several hypotheses have recently been proposed on this very topic, and it is reasonable to expect that a solution will be found to this problem (sooner or later).

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So would communication with extraterrestrials be possible?

The previous discussion has made it clear that there are good grounds for reflecting on the possibility of communication with extraterrestrials. Before coming to my own conclusion, let us look at arguments for and against the possibility of communication with extraterrestrials. I think it makes sense to claim that, if such communication is to be possible, the minimum requirement will be a measure of communalities, a common framework of understanding.

Philosopher Nicolas Rescher denies just this very possibility. He does not necessarily deny the existence of aliens, but argues that if they do exist, communication between them and us will not be possible. There would be no common ground since the differences between them and us will simply be too great (Rescher 1987). He argues that, yes, we share the same universe, same physics, same chemistry and even a common background of evolution. However, from the sameness of nature and its laws, it by no means follows that science would be uniform in the galaxy. Instead, there is enormous potential for diversity: alien projects, their science's conceptualisation and mechanisms for formulation would be vastly different from ours. They would not be functionally equivalent. Their language and thought processes are bound to be closely geared to the world of their experiences and so will their adjustment to their world. Rescher refers to the Romans, like Cicero, who did not have different views from us on quantum electrodynamics: they held no views at all on this aspect of physics, simply because it lay completely outside their conceptual reach and repertoire (Rescher 1987). So too with the aliens and ourselves.

Rescher further argues that we have no dictionaries to translate or decipher an alien language the day after the first contact had been established. Neither do we have a Rosetta stone to turn to and nor can we inductively conclude from a number of human languages a key to any understanding of an alien language.

But is this scepticism justified? I do not think so. I argue that aliens are not gods who speak some form of esoteric magical language. It may be and surely will be difficult to decipher an alien language and science, but there are factors counting against such scepticism. I will now argue on mainly philosophical grounds that communication will be possible. For evolutionary reasons, extraterrestrial intelligent life forms will be enough like us to find a common ground, develop a bridgehead and so make communication from them intelligible.

However, would this be possible if alien biological equipment, their evolved brains and physiological-anatomical constitution, are vastly different from ours? Must their conceptualisation and thinking, then, not be vastly different from ours? To address this issue, I shall combine insights from

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functionalist philosophy with those of the philosopher John Searle. Although there are differences between Searle and functionalism, in my view the two converge – at least to an extent. Thomas Nagel, Colin McGinn, David Chalmers and Frank Jackson in their philosophies of mind came to much the same conclusions as Searle. Both functionalism and Searlian philosophy are committed to a distinction of *ontological levels* (Antonites 2011). Consciousness and brain are not the same, but yet they are. How? According to the line of thinking of both functionalism and Searle, brain states are realised as mental states without being reducible or identical to those states: the mind cannot ontologically be reduced to or collapsed into lower level material brain states. In terms of causality they can, because consciousness and mind are caused by brain states such as neuron activity: “The sheer qualitative feel of e.g. pain is a very different feature of the brain from the pattern of neuron firings that cause the pain. Consciousness has a first- person or subjective ontology and so cannot be reduced to anything that has a third – person or objective ontology” (Searle 1997:31, 212).

Likewise, functionalism claims that mind is ontologically irreducible to, but functionally part of, a causal system. This means that higher-level entities such as minds are autonomous and not linked to lower-level physical brain states. Higher levels thus supervene on (depend on, and/or determined by) lower levels. Like Searle, therefore, functionalism is anti-reductionist, and is committed to a conception of the universe as containing distinct and *irreducible levels* of properties (Heil 2006). The lower level (physical brain) possesses the right sort of causal structure by virtue of the constituting and *arrangement* of its material parts. Searle rightly says we cannot make an ontological reduction on the grounds of a causal reduction, a reduction that we can make: “Consciousness is entirely causally explained by neuronal behaviour but is not thereby shown to be nothing but neuronal behaviour ... I say ‘Consciousness is irreducible to third-person neurobiological processes’ ... what I mean is that consciousness is causally reducible but not ontologically reducible” (Searle 1997:83, 88).

Some time before Searle and functionalism, Erwin Straus argued for something similar: humans have the capacity to transcend the sensory world, and are not limited or secluded to this world (Straus 1956). *Humans think, not the brain*; we are machines that have brains but not brains that are machines; brains do not have knowledge about the stimuli they receive, they know nothing about muscles, cannot distinguish, because they cannot think (Straus 1956:124, 167). “My understanding of self-consciousness is that it is something biologically based. Because of evolution humans are not unthinking, unfeeling *automata*. Self-consciousness gives us plasticity and flexibility in making choices in the light of alternative possibilities, because free will presupposes self-consciousness” (Antonites 2010:612). But how does this relate to extraterrestrials?

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Multiple realisabilty

The above implies multiple realisabilty. Multiple realisabilty is a central idea of functionalism, but not necessarily of Searle (Antonites 2011). I now argue further and claim that both human brains and minds are biological. If we then apply this to extraterrestrial beings, we can claim that their material embodiments, their biological brains, may be very different from ours. While our brains' physiological constitution is carbon based, an extraterrestrial from, say, the discovered planet in the Alpha Centauri system, may possess a brain that is silicon based. Yet this brain can be isomorphic with ours: the alien brain will share the same "software"; the aliens will have a higher level of thinking, feelings and emotions, the latter is realised by different brains, the "hardware" as lower level. This is an analogy with computational machines and not a reduction to these machines. : The analogy lies in the fact that the same computations can be made by different machines which are made of different stuff.

For humans it may be the firing of C-fibres which cause pain, but for an extraterrestrial, it may be something different that causes pain (Kim 2003). As we saw earlier on, the same mental states can be realised by diverse physical *causal* kinds. (Kim 2003). Let us apply this to extraterrestrials. Functionalism does, to a certain extent, follow a top-down causality, as does Searle. Not so Kim. Kim argues that if the mental cannot enter into laws, it cannot qualify as a causal state. I disagree. I do not think that the idea of causality requires such a restriction. Both downward causality and upward causality are indeed possible – contingent causality, although less like a law, is quite real and also operative in scientific explanations (Antonites 2011).

If this is the case, can we at the same time accept the possibility of communication with aliens and stick to a materialist one level identity philosophy? One level indicates that brain states and consciousness do not comprise two levels, but is on one and the same level. In fact they are identical? I do not think so. Why? An identity theory will largely rule out communication with extraterrestrials: if each mental state is identical with a certain brain state, then there is no possibility that extraterrestrials, , whose brains may be constructed from very different stuff than ours, could also have mental states – or at least, if they had mental states, these would have to be completely different from those that we have (Antonites 2011). An identity theory will claim, for example, that C-fibres firing is pain itself; in other words, identical with it as an axon (Searle 2004). The point is that pain is not ontologically the firing of the C-fibres themselves (Antonites 2011).

I claim, therefore, that multiple realisabilty legitimises the view that there may be a common ground between extraterrestrials and us. Extraterrestrial intelligences with different physiological compositions from terrestrial intelligences can experience pain, joy and also be rational, logical and

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thinking beings. This, I think, justifies the conclusion that communication between terrestrials and extraterrestrials is quite possible. If so, does it follow that we will understand each other?

Evolutionary convergence

The above conclusion is further supported by the fact of evolutionary convergence. In terms of the principle of causality, many variables can lead to a diversity of outcomes. However, the same principle also makes the same outcomes possible in different contexts. In the previous paragraph we just argued with the given of biological brains and mind as to terrestrials and extraterrestrials. Evolutionary biological convergence here enters into the equation. Convergence makes sense in terms of causality.

It is now known that eyes evolved no less than 40 times in different groups of animals separately and independently of each other (Mayr 1987), including humans. This shows that a highly complicated organ like the eye can evolve repeatedly and convergently when it appears to be selectively advantageous to an organism (Mayr 1987).

Likewise, similar anatomy evolved independently in two mammalian groups: although placental and marsupial mammals have a common ancestor in the Mesozoic era, these two groups of mammals have been genetically separate for tens of millions of years (Raup 1987). In North America the placental mammal the sabre-toothed tiger appeared; independent from this, in South America at the same time geologically, a marsupial version of the sabre tooth tiger appeared. Surprisingly similar anatomy developed independently in the two mammalian groups. Like the eye, this is also an example of evolutionary or adaptive convergence. The similar anatomy apparently evolved in response to similar environmental pressures, and/or opportunities (Raup 1987). Both evolutionary lines were faced with the same problems and both chose approximately the same solution (Raup 1987). I argue that, like the eye, the similar anatomy indicated causal inevitability. Convergence has occurred frequently on Earth, even though the general course of evolution is largely unpredictable (because it does not have any intrinsic goals). I also argue that, given that the same physics and chemistry applying in our galaxy, if convergent evolution could occur repeatedly on planet Earth, it could also occur repeatedly on exoplanets.

Common ground for understanding

If we accept the above, we can now pursue the issue of whether or not communication would be possible between us and extraterrestrials.

Philosopher Michael Ruse argues that he has no reason to believe that circles are not really circles but, in fact, squares. A being that develops adap-

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tations that enables it to deal with squares, which are really squares rather than circles, is in some sense better off than a being which cannot do this. By the same argument, there is no reason to think that on Alpha Centauri's planet, $2+2$ will not equal 4, or that squares will really be circles – or that fire will not cause burning or, more generally, that the same invariant cause will not lead to the same effect. Chimpanzees learn to associate cause and effect in the same ways that humans do, and this learning ability means that both chimps and humans are better adapted to their environment (Ruse.1986). (Yes) This is something transcendental (which is not the same as transcendent) and a priori within the concrete and real world. These things hold true as such, but *per effectam* these beliefs enable us and chimpanzees to survive. One can agree with Ruse's claims that we have different senses, which give different information, but they all cohere on the reality of the world, especially the sense of sight and touch. Chimpanzees avoid objects in their path just as much as humans do. Similarly, they manipulate objects and they do so essentially in the same way that humans do and for the same sort of reasons. Both we and chimpanzees are organisms who have adapted, through natural selection, to deal with our and their (chimpanzee) worlds: "Moreover, I have no reason to doubt that really $2+2$ does equal 4. Why? Because I have no reason to, that's why! It is simpler to assume that a being which recognises that $2+2$ equals 4 is better adapted than one which does not, if indeed $2+2=4$ and not 5 " (Ruse 1986:55). I would add: The $2+2=4$ and not 5 it is a priori – in Kantian thinking: it is right because it is right. I think Ruse's claims here do not contradict this a priori. The better adaption he refers to is a consequence of the a priori and not the other way round. With Ruse we argue that extraterrestrials will share our powers of comprehension because we are both products of the same process of evolution. To think in terms of cause, etc. is an adaptation for dealing with reality – imagine if we did not associate fire with burning – and it is inconceivable that extraterrestrial intelligence would not share such adaptations (Ruse 1987). Extraterrestrial intelligence, like us, will have learned to cope with their world, and to recognise the underlying patterns which are common to the whole universe. There will also be some underlying basic premises held in common by humans and extraterrestrial intelligence. Such things as the basic premises of logic, mathematics and causality will be the same.

These views can be compared to the artificial intelligence pioneer of Massachusetts Institute of Technology. Marvin Minsky argues for the universality of science – terrestrials and extraterrestrials. Minsky, even more than Ruse, does not hesitate to describe several scientific truths as a priori. Not surprisingly, he links his remarks with the work of the philosopher Kant.

Minsky argues that extraterrestrial intelligence will think like us in spite of biological and environmental differences. All intellectual problems-solvers are subject to the same ultimate constraints, whether on Earth or

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whether on a planet in the galaxy of Andromeda (Minsky 1987). There are limitations on space, time and materials. Even though extraterrestrial intelligent societies may be millions or billions of years more advanced than us, they will be forced to develop arithmetic and a language that will not be totally alien to our own (Minsky 1987).

Jill Tarter, president of the SETI Institute, argues that both terrestrials and extraterrestrials will have to construct a language of mathematics based on concepts that both parties understand. Extraterrestrials must understand the basic laws of physics, especially those related to electromagnetic radiation (e.g. light). They must also understand three-dimensional geometry in order to build the high-gain antennae required for radio astronomy (McConnell 2001).

Minsky puts it more strongly. Our constructs and concepts will be understandable to both. He argues that arithmetic is indeed the same everywhere in the universe; alien mathematics necessarily will be congruent on our own. And because things are, in their most general aspects, the same everywhere, aliens will have evolved thought processes and language that will match our own to a degree that will enable us to comprehend them. Human and alien intelligence will deal with reality in much the same and common way. When we meet extraterrestrials, we will be able to converse with them (Minsky 1987).

The concept of *thing* is indispensable for managing the resources of space and the substances that fill it. The concept of *goal* is indispensable for managing time – both for what we do and for what we think about. These notions will be used by extraterrestrial intelligence too. They are easy to evolve and there appear to be no easily evolved alternatives for them: “Because of this, we can expect certain ‘*a priori*’ structures to appear, almost always, whenever a computation system evolves by selection from a universe of possible processes” (Minsky 1987). Number and arithmetic are examples of this. Minsky conjectures that this may be why different people can communicate so perfectly about such matters – although their minds may differ in many other ways. So too aliens (Minsky 1987). Minsky thus links the objective *a priori* with the more empirical theory of evolution and natural selection. Let us see how he argues about a thought experiment:

He claims that it is inevitable that $2+2$ must equal 4 or *minus time minus is plus*. Saying that, let us as an “experiment” try or create a new number system. It is like the ordinary one, except that you skip some number, say 4.: “It just won’t work. Everything will go wrong, e.g. you will have to decide what is 2 plus 2. If you say it is 5, then 5 will have to be an even number,, and so also must 7 and 9. And then, what is 5 plus 5? Should it be 8, or 9, or 10? You will find that to make the new system be at all like arithmetic; you will have to change the properties of all the other numbers. Then when you are finished, you will find that you have only changed those

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number's names, not their properties at all There is just no way to take a single number out, or put another in. Nor can you change a single product, sum, or prime ... One cannot make the smallest hole in it or make it stretch or bend the slightest bit. You have to take it in as it stands. The whole thing, all or none, unshakable ..." (Minsky 1987:121,122). If it were not a priori, it would be changeable. With this Minsky suggests that the universe is far more constrained than we think – we can therefore communicate perfectly about numbers. Extraterrestrial intelligence must, too, have evolved like us by: "searching through some universe of possible processes –and any evolutionary process must first consider relatively simple systems ,and thus discover the same isolated islands of efficiency" (Minsky 1987:122).

Let us now see how Minsky views the a priori and objectivity in things non-mathematical. *Causes* are good examples. Why do we seek a cause for every difference, move or change? In a very Kantian way, Minsky distinguishes between *object*, *difference* and *cause*. Our minds tend (I interpret this 'tend' here as something transcendental) to describe every situation, real or mental, in terms of separate *objects* and relationships between objects. We see *difference* between or changes in objects: whenever an object undergoes change, or two objects are compared, the mind ascribes some difference to them. When any difference is conceived, the mind finds a *cause* for it – something that is held responsible. Extraterrestrials cannot do otherwise.

George Lakoff and Nunez follow the opposite line of thinking, even though they do not discuss the issue of extraterrestrials. Unlike Minsky and Ruse, they reject the idea of a priori, transcendental, objective truths. However, they also try to make sense of the objectivity of mathematics. Against any a priori, they claim that mathematics has many ontologically distinct and incompatible notions of number (Lakoff & Nunez 2000). One could comment: indeed, even though alternative geometries exist and thus incompatibilities, things are consistent within one and the same system. However, transcendent need not mean that mathematical ideas as objective entities are drifting around somewhere in space. Neither does the idea of objective a priori truths in mathematics necessarily imply something mystical.

Lakoff and Nunez reject an objective a priori, by identifying it with romance which, according to their interpretation, can be seen in the Sagan inspired movie *Contact*. They claim that the existence of a Platonic and a priori mathematics cannot be addressed *scientifically*. Science alone can neither prove nor disprove the existence of mathematics, just as it cannot prove nor disprove the existence of God (Lakoff & Nunez 2000). Agreed, but I do not think that the existence of God is similar to the existence of mathematical entities. Mathematical truths are not empirical truths, but have to do with validity, while the existence or not of God is something existential and relates to faith. Not so mathematics. I therefore disagree that a belief in

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Platonic mathematics is romantic or similar to religious faith. One can speak of a belief in Platonic mathematical entities like we speak of a belief in exoplanets. Are they the same? Not quite.

Lakoff and Nunez (2000) claim that mathematics comes from us, we create it, but it is not arbitrary; it is not merely a historically contingent social construction. I agree. But why is it not arbitrary? Lakoff then answers: "What makes mathematics nonarbitrary is that it uses the basic conceptual mechanisms of the embodied mind as it has evolved in the real world" (Lakoff & Nunez 2000:9). Agree again, but is this the complete picture? I do not think so. The argument here seems to be circular. Our minds created mathematics, but our minds evolved. The theory of evolution itself is a product of evolution! (Trigg 2002).

Conclusion

This article was written from a philosophical standpoint and considered the quest argumentatively and interpretatively. The meaning of the quest we described is situated in transcendence. Transcending earthly habitat, it is a venture into the unknown. Jaspers claimed that nothing is indifferent to science.

The background of NASA's *Curiosity*, exoplanets and the work of SETI were all brought to bear on the issue.

The relevance of causality in the quest was examined. With this the opposing views of biologists such as Mayr and Dobzhansky on the one hand and Sir Francis Crick on the other were examined. It was shown that, although evolution has no immanent goals or plans, it is not chaotic and follows a normal line in the light of universal constraints.

To argue for common ground between terrestrials and extraterrestrials, I combined the philosophy of Searle and functionalism. I indicated how multiple realisabilty and isomorphism links up with the latter, and I discussed the opposing theories of Mayr and Crick. This opposition was then interpreted as part of the issue of the underdetermination of scientific knowledge. Underdetermination involves the control of variables in the empirical sciences. This is not the case in a non-empirical science like mathematics, where there is no such control. This determines the difference between confirmation in the empirical sciences and proof in mathematics. The latter pointed to the control of variables and so the difference between reliable knowledge in the empirical sciences and proofs in mathematics.

I also considered and evaluated the opposing views of Minsky and Lakoff considered and came to certain conclusions.

The major and final conclusion was that the existence of extraterrestrials and communication with them is a viable and rational possibility. Aliens cannot be too alien.

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The quest means that we are not only citizens of Earth, but also of the cosmos or the universe. Theologically speaking, the words of Psalm 8 obtain a both new and more significant meaning. The final detection of extraterrestrials will indeed cause rethinking on many theological issues as well. It is unthinkable that aliens would not have a theology or views on God.

Although there will certainly be problems arising from the acceptance of the existence of extraterrestrials (when detected) and the claims of Christian belief, there need not be a fundamental conflict with Christian belief (Antonites 1996). To date, little has been published about extraterrestrials within the discipline of theology. In the history of the Church, the fate of Giordano Bruno, who postulated the existence of extraterrestrials, is well known. It is less well known that the Vatican's views today on this same issue can be interpreted as the most progressive within Christianity. The director of the Vatican Observatory and a senior astronomer himself, Father Gabriel Funes, not only regards the Big Bang theory as the best explanation for the origin of the universe, but also strongly (much more than Bruno) argues for the existence of extraterrestrials. He sees in this no undermining of Christian faith and belief.

To conclude – the detection and communication with extraterrestrials will put our existence, our science, our art and maybe even theology and faith into a radically new perspective. I claim that the day after the detection of extraterrestrial intelligence, humankind will be brought together as never before. The knowledge that we are not alone in the vast galaxy will address us existentially.

Works consulted

Antonites, Alex 2010. *Evolution: fact or theory?* Charleston, SC: CreateSpace.

Antonites, Alex 2011. Universals in the Universe. SETI II: SETI and Society. 62nd International Astronautical Congress, Cape Town, 3-7 October.

Antonites, Alex 1996. Sufficient conditions for extraterrestrial intelligence. *Hevormde Teologiese Studies*. Vol 52(1).

Anderson, Paul Scott 2012. 35 years later, the 'Wow!' Signal still tantalizes. *Universe Today*, February. Available: <info@universetoday.com>

Atkinson, Nancy 2012. Could there be 100 billion potentially habitable planets in the galaxy? *Universe Today*, March 15. Available: <info@universetoday.com>.

Beck, Lewis W. 1987. Extra-terrestrial intelligent life, in Regis, Edward Jr. (ed.), *Extra-terrestrials. Science and alien intelligence*. Cambridge: Cambridge University Press.

The meaning and challenge of the quest for extraterrestrials

Chalmers, David J 2003. Absent Qualia, fading Qualia, dancing Qualia, in O'Connor, Timothy & Robb, David (eds.), *Philosophy of mind. Contemporary readings*. London: Routledge.

Cockell, Charles 2012. How the search for aliens can help sustain life on Earth. *CNN*, October 4.

Crick, Francis 1988. *What mad pursuit. A personal view of scientific discovery*. London: Penguin Books.

Dick, Steven J. 2001. *Life on other worlds. The 20th century extra-terrestrial debate*. Cambridge: Cambridge University Press.

Drake, Frank & Sobel, Dava 1993. *Is anyone out there? The scientific search for extraterrestrial intelligence*. London: Souvenir Press.

Du Toit, Cornel W. 2010. Shifting frontiers of transcendence in theology philosophy and science, in Du Toit, C.W. (ed.), *Homo transcedentalis? Transcendence in science and religion: Interdisciplinary perspectives*. Pretoria: Research Institute for Theology and religion, UNISA.

Du Toit, Cornel W. 2010. Immanent transcendent angles on a post-reformation theology, in Du Toit, C.W. (ed.), *Homo transcedentalis? Transcendence in science and religion: interdisciplinary perspectives*. Pretoria: Research Institute for Theology and religion, UNISA.

Heil, John 2006. *Philosophy of mind. A contemporary introduction*. New York: Routledge.

Jaspers, Karl 1953. *The origin and goal of history*. London: Routledge & Kegan Paul Ltd.

Kim, Jaegwon. 2003. Multiple realization and the metaphysics of reduction, in O'Connor, Timothy & Robb, David (eds.), *Philosophy of mind. Contemporary readings*. London: Routledge.

Kremer, Ken 2013. Curiosity discovers environment where life could have thrived on ancient Mars. *Universe Today* March 12. Available: <info@universetoday.com>.

Ladyman, James 2006. *Understanding philosophy of science*. New York: Routledge.

Lakoff, George & Nunez, Rafael E 2000. *Where mathematics come from. How the embodied mind bring mathematics into being*. New York: Basic Books.

Löwith, Karl 1953. *Weltgeschichte und Heilsgeschehen*. Stuttgart: Kohlhammer Verlag.

Löwith, Karl 1961. Vom sinn der geschichte, in Golo Mann, *Der Sinn der Geschichte*. Munchen: Verlag C.H. Beck.

Mayr, Ernst. 1987. The Probability of extra-terrestrial Intelligence, in Regis, Edward Jr. (ed.), *Extra-terrestrials. Science and alien intelligence*. Cambridge: Cambridge University Press.

The meaning and challenge of the quest for extraterrestrials

McConnell, Brian 2001. *Beyond contact. A Guide to Seti and Communication with Alien Civilizations*. Sebastopol, CA: O'Reilly and Associates.

Menzel, Donald 1965. Life in the universe. *The Graduate Journal* 7, 195-219.

Minsky, Marvin 1987. Why intelligent aliens will be intelligible, in Regis, Edward Jr. (ed.), *Extra-terrestrials. Science and alien intelligence*. Cambridge: Cambridge University Press.

Muracco, Michael 2012. SETI search of Kepler Planets receives first candidate signals. *Sky Watch*, January 8. Available: <<http://mwvastonomy.net/2012/01/seti-search-of-kepler-planets-receives-first-candidate-signals/#ixzz2UcYGFt1o>>.

Newitz, Annalee 2012. 10 Planets from the Alpha Centauri System, according to science fiction. *Io9*, 17 October.

Popper, Karl 1961. *Selbstbefreiung durch das wissen*, in Golo Mann (ed.), *Der Sinn der Geschichte*. Munchen:Verlag C.H. Beck.

Raup, David M. 1987. ETI without intelligence, in Regis, Edward Jr. (ed.), *Extra-terrestrials. Science and alien intelligence*. Cambridge: Cambridge University Press.

Rescher, Nicolas 1987. Extra-terrestrial science, in Regis, Edward (ed.), *Extra-terrestrials. Science and alien intelligence*. Cambridge: Cambridge University Press.

Ruley, John, D 2008. Intelligence a Rare Commodity. *Space Daily*, April 18.

Ruse, Michael 1987. Is rape wrong on Andromeda? An introduction to extra-terrestrial evolution, science, and morality, in Regis, Edward Jr. (ed.), *Extra-terrestrials. Science and alien intelligence*. Cambridge: Cambridge University Press.

Sagan, Carel & William I. Newman, William I. 1987. The Solipsist approach to extraterrestrial intelligence, in Regis, Edward Jr. (ed.), *Extra-terrestrials. Science and alien intelligence*. Cambridge: Cambridge University Press.

Searle, John. R 1997. *The mystery of consciousness*. New York: The New York Review of Books.

Searle, John. R. 2004. *Mind. A brief introduction*. New York. Oxford : Oxford University Press.

Scheler, Max 1949. *Die stellung des menschen im Kosmos*. Munchen: Nymphenburger Verlagshandlung.

Straus, Erwin 1956. *Vom Sinne der Sinne. Ein Beitrag zur Grundleging der Psychologie*. Berlin: Springer-Verlag.

Straus, Erwin 1960. *Psychologie der Menschlichen Welt. Gesammelte Schriften* von Erwin Straus. Berlin: Springer-Verlag.

Trigg, Roger 2002. *Philosophy matters*. Malden, Mass: Blackwell.

Van Peursen CA 1968. *Feiten, Waarden, Gebeurtenissen. Een Deiktische Ontologie*. Hilversum: W de Haan/Amsterdam: J.M. Meulenhoff.

