Philosophical issues in the search for extraterrestrial life and intelligence[1]

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Abstract: In the search for extraterrestrial life and intelligence, it is essential to clarify what is to be meant by 'life' and 'intelligence'. I first analyse what it means to 'define' these words. I will show that some philosophical prejudice is unavoidable. As a working hypothesis, I consider two types of philosophy: 'natural philosophy', seeking for some essence of things, and 'critical (or analytical) philosophy', devoted to the analysis of the procedures by which we claim to construct a reality. An extension of critical philosophy, epistemo-analysis (i.e. the psycho-analysis of concepts) is presented and applied to the definition of exolife and to extraterrestrial 'intelligence'. Some pragmatic conclusions are finally drawn for future search strategies.

Introduction

The search for extrasolar life (or in short 'exolife') starts inevitably with some prejudice about the meaning of the word 'life' and its operational consequences. On Earth, life is perceived under two aspects: organic life and psychical life. Organic life, the subject of Biology, is shared by all livings, from bacteria to humans. Psychical life is the attribute of humans and, to some extent, to some animals. In the generally shared common view, psychical life culminates in human "intelligence" and there is no rupture, no fundamental gap between human intelligence and animal psychology. Intelligence is then just viewed as a skill, an ability to react to situations and the environment. From this point of view there is no essential gap between intelligence and superior instincts, as developed for instance by Proust ([2010](#)). In the context of Astrobiology, the question naturally arises whether these approaches are adapted to exolife. Here I treat these questions with a philosophical approach. To simplify the discussion I consider two types of Philosophy of Knowledge: "natural" philosophy and critical philosophy. Hereafter I first clarify some differences between these two conceptions of philosophy. I briefly explain why critical philosophy is more efficient than natural philosophy. I finally apply this discussion on critical philosophy and its extension called "Epistemo-Analysis", to attempt defining organic and intelligent exolife. For the latter I will point out its basic difficulties.

Remote and *in situ* observations show that there is no form of evolved life elsewhere in the Solar System. However, there is plenty of room for evolved life on extrasolar planets. Indeed, about 50% of stars in the Galaxy have rocky planets in the 0.5–2 AU orbital range (Mayor *et al.* [2011](#)). The habitable zone around stars covers about 10% of the range and for low-mass planet multi-systems, there is always a stable orbit in this zone. Recent observations show that whenever a low-mass planet is detectable on such orbits, it is indeed detected (Udry [2012](#)). One can thus safely claim an order of magnitude of a billion habitable planets in the Galaxy. I therefore deal here only with life on these exoplanets. To conclude this introduction, I underline that the present discussion is inspired by its pragmatic consequences: what actions to take to search for organic and psychical exolife?

Natural versus critical philosophy

The word "Philosophy" covers a wide continent, with unclear borders and regions, such as political philosophy, ethics and philosophy of knowledge. To simplify the discussion, as a working hypothesis, I consider two approaches of philosophy of knowledge that I call natural philosophy and critical philosophy.

Natural philosophy

The expression 'natural philosophy' refers to two different approaches: Natural philosophy as the study of nature and philosophy of nature. The later is inspired, for instance in the work of G.W. Goethe and F. W. von Schelling, by a romantic focus on the place of Man in Nature (and today in the Universe). In the mind of modern adepts of natural philosophy as the study of nature, this approach is nothing but science. However, I claim that behind this, apparently rational, approach based on observations there is always the latent belief that there exists a "Reality" behind observations and that knowledge has to catch its essence in statements called "The Truth". This shift in meaning is for instance illustrated by the recent NASA report 'Cosmos and Culture' (Dick & Lupisella

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[1] Presented at the Conference « 50 years of The Drake Equation » Paris, November 2011.

2009). Knowledge then acts as some identifications between the subject's mind and the intimate essence of nature, based on opinions and convictions rather than on critics and analysis of the scientific methodology, like in religious beliefs and faith. It results that there is a tendency of projection of human feelings on the external world, so that natural philosophy has a flavour of animism. This was already pointed out by Bachelard (2002) as the obstacle of 'substancialism' and of animism in his book *The Formation of Scientific Mind*.

Note that believers in natural philosophy are rather insensitive to the analysis between the two approaches of philosophy, since their convictions are based on a kind of faith.

Critical philosophy

Critical philosophy starts with an analysis of the procedures by which we explain, thanks to natural language, our various experience, in any domain. This explanation is called a 'theory' or more generally a discourse. This approach was thoroughly developed in Kant's *Critique of Pure Reason* (Kant 2003) and reassessed in the context of modern science by Cassirer (1965) in *The Philosophy of Symbolic Forms*. It has been remarkably summarized in the introduction of the *Critique*: "If our knowledge starts WITH experience, it does not prove that it only derives FROM experience, since it could well be that even our experience-based knowledge is a composite of what we receive from our perceptions and of what our power to know [i.e. concepts] produces itself ". More recently, various authors, following the so-called school of analytical philosophy, have pointed out that an unavoidable instrument to deal with our experience is natural language. In this view, our knowledge is always a construction, with the help of language, of a so-called "reality" that does not pre-exist, and not the discovery of an essence of pre-existing things. Opposite to natural philosophy, the approach of critical philosophy has always been fruitful in science: to give just an example, it has helped to get rid of the notion of aether in Physics.

Some authors characterize the natural philosophy/versus critical philosophy as realism/versus idealism. However, the idea of a reality as source of perception is in fact a metaphysical notion since we never experience directly any 'reality' but only perceptions and their treatment by language. In this respect, realism is an idealism and the only realism resting on experience is Critical Philosophy.

To summarize, critical philosophy deals with the processes of construction of a 'reality', whereas natural philosophy deals with an essence of things (illusory from the point of view of critical philosophy).

Epistemo-analysis, an extension of critical philosophy

For critical philosophy, concepts are operations acting on the world of experience. 'Epistemo-analysis' is an extension of critical philosophy, which unveils and analyses the emotional roots of concepts. This neologism, copied from 'psycho-analysis' was introduced recently[2], but the notion existed long

before, for instance in Bion's *Theory of Thinking*[3] (Bion 1962a). Briefly speaking, it makes use of two notions: 'family romance' and 'object-relation'[4]. Family romance is a way to construct abstract notions like 'the past' upon the phantasized subject's own past[5]. Object-relation is a subtle and complex notion (deriving from the Freudian notion of drive) by which the subject at the same time is embedded in a relation with his objects (more exactly 'proto-objects') of desire and is detaching himself from this 'embeddedness' so that the proto-objects become external objects (of desire). In this conception of object-relation, an object completely independent from relations with it is a construction.

It must be noticed that the object-relation is logically different from a relation *with* an object. In the object-relation, the relation is *in* the object. Therefore the relationship between the relation and the object is different from the subject/predicate structure of any grammatically correct statement in natural language (analysed as early as 1662 in the famous *Logic or Art of Thinking* by Arnauld and Nicolle). That is why it is so difficult to explain the object-relation in natural language whose structure is not adapted to what it is about.

The primary root of embeddedness is affection and objects are 'good' objects, or objects of love. This is the unconscious root of living objects and of Life. Empirically it happens that the observable behaviour of these living objects (constructed from object-relation) is correlated with another type of experience, namely physicochemical experiments of modern biology (like the standard organic chemistry). Life as viewed by biology is then an intellectual construction based on physical concepts. Astrobiology then tries to find similar observations outside the Earth.

'Definition' of exolife

Let us present more details on the above constructive approach applied to exolife. However, l will discuss before what is expected from a definition.

What is a 'definition'?

The word 'definition' is the subject of a very wide literature in philosophy, impossible to summarize in a few paragraphs. It started with Aristotle, followed in the Middle Ages by Nominalism and more recently by different Schools of Logic. In his Posterior Analytics Aristotle discusses the definition as designating the collection of attributes (clearly characterized according to the method of 'division') of something (II, Section 3 [Theory of Definition], Chapter XIII). For different adepts of Nominalism (starting with Roscelin of Compiègne, followed by Thomas Aquinas, Pierre Abélard and others) a definition is a name creating a category without seeking for an essence. In contemporary literature of natural sciences a definition essentially refers to two different situations. First, it means an arbitrary convention, like for instance the neologism 'pulsar'.

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[2] See Schneider (2002) and Schneider (2006).

[3] See also Bion (1962b).
[4] See Laplanche & Pontalis (1974).
[5] See its application to Cosmology in Schneider (2006).

On the other hand, it also often designates an attempt to clarify the content of a pre-existing word for which we have some spontaneous preconceptions, whatever their grounds, and to catch an (illusory) 'essence' of what is defined. Use is then made of pre-existing plain language words, which carry an *a priori* pre-scientific content (which can be revealed by epistemo-analysis) likely to introduce some confusion in the reader's mind. In a recent attempt, Rosch (1973) tries to put, thanks to notion of prototype, definitions in full light, even when they are vague. However, this approach ignores the empirical fact that words (when they are not pure conventions), and their unconscious (and therefore somehow obscure) content revealed by Epistemo-Analysis, pre-exist any definition.

Modern language theory has pointed out the performative nature of words. They do not really designate pre-existing things; they do create in a first step what they designate as exterior and pre-existing to them in a second step.

Since a definition constructs what it defines, there is no absolute definition, only a definition depending on the procedure by which it constructs the *definiendum*. In this sense, there is an essential relativity of definitions.

In the remaining part of this paper, I will deal with two definitions of life: a definition based on object-relation and a definition based on standard laboratory Bio-Chemistry (and more generally on Physics).

Life as a construction and its arbitrariness

As seen above, life is not an objective attribute; it is always a construction, based on object-relation or on physico-chemical concepts like in Biology. Therefore, life, as seen by Astrobiology, is not life in the object-relation sense. Moreover, life in the object-relation sense, i.e. as an attribute of (unconsciously) emotional relationships, cannot be constructed from purely physicochemical concepts. Astrobiologists, as physicochemists working on celestial observations, thus make an improper use of the word life, which inevitably carries the emotional content of object-relation involved in the primitive sense of the word. By doing so, they are fooling the reader[6]. A pertinent analogy is given by the question 'When does the human embryo become a human being?' or 'When do pre-hominids become humans?'. The time at which this transition happens is, unavoidably, an arbitrary choice. To shed a different light on this issue, I note a similarity with Quantum Physics. In Quantum Theory, observables (represented by linear operators on a vector space) cannot be built from the state vector representing the structure of the measurement apparatus. They are *sui-generis* as pointed out by Ulfbeck & Bohr (2001).

There are many discussions on the definition of life and its pertinence in the literature. For instance Bedau (2007) deals with the question 'What is Life?', but only under the aspect of objective properties (physical, structural etc) of organisms (natural or artificial). Cleland convincingly demonstrate that

"water is H_2O" is an ill-formed answer to "what is water?" Cleland 2012. Unfortunately, she has limited her discussion to Martian life, whereas extrasolar life, being perhaps not chemically based (Schneider 1975) is like to pose more problems than martian microbes. The view I propose is different: life is not a property of an object or a system, it is a property of our relationships to it. These relationships are essentially emotional. It is only in a second step that biologists have recognized that these relationships are correlated with physicochemical properties. These correlations are only correlations and no explanations. To summarize, there is no life *per se*, but only signs of life and *alive* or *not alive* are as subjective as *beautiful* or *ugly*.

Organic life

To help to understand the present views, let me present them in other words. There is no essence of life, even organic. Life, i.e. the claim that such or such observations reveal that it originates from a living is an arbitrary construction. Experience only consists, like in the object-relation, in relations with objects (constructed out of observations), which we declare (and want to believe) that they are living. Astrobiologists want to declare as living objects that are sufficiently complex and whose complexity is stable and self-regenerated. However, such properties also exist for objects recycling matter such as second generation stars recycling the interstellar medium, which are not conceived as living. They do just show an amplification of local entropy fluctuations toward less entropy. Therefore objects declared as living in the astrobiological sense of self-organized structures, are not necessarily living in the object-relation (i.e. emotional) sense. There is an analogy here with light. When a community of speakers watches a strawberry, it says 'it is red'. When physicists make a spectral analysis of its colour, they find a wavelength around 675 nm and there is always a correlation between the plain language word 'red' and that wavelength range. From this correlation one can identify 'red' and 675 nm. However, there is no colour associated with wavelengths $\gtrsim 750$ nm and $\lesssim 400$ nm. Similarly, there may be not life, in the object-relation sense, associated with complex structures (very) different from our terrestrial organisms.

Intelligent life

For 'intelligent' life, we face in addition a paradox. Indeed, we then try to define alien, i.e. non-human, intelligence in terms of human concepts. It is a kind a paradox like the Zeno paradox: how to analyse motion in terms of static terms, namely a series of static positions. In motion there must be something beyond static positions[7]. It is the same with extraterrestrial intelligence: human intelligence is a kind of prison which we have to escape. This situation is experienced in SETI in which astrobiologists plan to interpret SETI signals with human concepts. One hope

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[6] Like cosmologists who fool the reader by calling « time » the parameter *t* in Astrophysics (Schneider 2006).

[7] In the mathematical treatment of the paradox, what is beyond static positions is the abstract notion of an infinite series of infinitesimal motions.

to escape this prison is to find in ourselves resources beyond standard intelligence, like (psycho-analytic) unconsciousness is beyond consciousness. The paradoxical aspect of an extra-terrestrial intelligence is even reinforced by the notion of emergence of intelligence in the Universe. Indeed, as I pointed out earlier (Schneider 2006), a historical perspective of the Universe is not written in the equations of Cosmology since the notion of time required by History is in fact a psychological, or more exactly a language-based, notion, different from the t parameter of Cosmology. Time is therefore a production of 'intelligence' which is thus prior to the concept of time required by the notion of emergence. In this respect, 'emergence of intelligence' (in the Universe) is an oxymoron. Intelligence can only construct afterwards an abstraction like its own emergence.

Operational conclusion

It is comprehensible that astrobiologists start with some prejudice about exolife as guidelines for their observations, just because being space-based these observations are very expensive. However, at the same time we should keep our minds open and possibly make as much and diverse observations as possible and select from them those with which we can have interesting relations. I concur with Machery's view that "scientists should discard the project of defining life" (Machery 2012). However, I am less certain about his similar claim about ethicists. We are not only individuals but also social animals, and society as a whole can express perhaps not a rigid definition but an opinion, through the voice of ethicists, about life in general and extraterrestrial life in particular. It will unavoidably have pragmatic impacts. Indeed, suppose that we find spectral signatures that could be interpreted as potential biosignatures on a habitable exoplanet and that to investigate it further we need a very costly space mission. To decide whether that mission should be funded, or not, will depend on the opinion of some funding body that will be based on the aspects of life that are behind these biosignatures. Like in bio-ethics in which the choice that the embryo is human or not is arbitrary, the claim that such or such observations come from living beings will be arbitrary.

Perhaps will we need some day exo-Bioethical Committees, similar to the present Bioethical Committees?

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