Philosophy of Nature in Cross-Cultural Dimensions

The result of the International Symposium at the University of Vienna

Issueds by

Verein für Komparative Philosophie und Interdisziplinäre Bildung

(Association of Comparative Philosophy and Interdisciplinary Education), "*KoPhil*" in Vienna

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Preface

In our current globalized world, computer and cognitive science based on analytical and natural scientific thought tends to dominate and shape world views. Surely, no one doubts the benefits of scientific thought. However, a question is addressed to everyone: *Does philosophy become only a second-tier type of knowledge relative to computer, cognitive, and natural science?* The specific question of the degree to which philosophy, as a synthetic and integrative science of human thought that serves, helps, and supports the quality of human existence, is not sufficiently addressed as a philosophical topic. If philosophy is primarily a Human-Science oriented towards the examination of all knowledge, thinking, and handling of the human experience through critical (and self-critical) reflections, then one can suggest that the current global trends are problematic for the proper recognition and (perhaps) reorientation of philosophy as a Human-Science for the near future.

In response to this problematic state, our Association of Comparative Philosophy and Interdisciplinary Education (Verein für Komparative Philosophie und Interdisziplıäre Bildung), „*KoPhil*“ in Vienna (Austria / Europe) organized an international symposium „Philosophy of Nature“ at the University of Vienna in May 2016. It successfully brought together Philosophers, Human- and Natural Scientists from 13 nations of the world: Austria, Germany, Serbia, Italy, Greece, Poland, Russia, Japan, Taiwan, China, USA, Canada and Australia. It endeavored to foster a *„cross-cultural & trans-disciplinary interaction“*: between Philosophers who are interested in Natural Sciences as well as Natural Scientists who are interested in Philosophy. All met on the *topos* of a transcultural interaction with the purpose of bringing about the emergence of meaningful exchange at the limits and borders between the Natural- and Cognitive sciences and Philosophy.

This issue is published as a collection of articles relaying the actual content of the spoken lectures as directly as possible. In so doing, we hope that interested readers might get a sense, *a topos,* for the creation, production, and emergence of new modes of thought as they were presented within an intellectual, critical, and professional academic setting. We hope that this issue awakens within the reader new interest in interdisciplinary philosophy.

September 2016

Head of the Association of Comparative Philosophy and Interdisciplinary Education, *KoPhil* in Vienna, HASHI Hisaki

Opening Session

Can Scientific Knowledge be called „Truth“?

Herbert PIETSCHMANN (Vienna/Austria)

As physicist I would like to begin with a famous quotation from Albert Einstein. He said:[1] “As far as the laws of mathematics refer to reality, they are not certain, and as far as they are certain, they do not refer to reality.” What did he mean with this profound statement?

Let me give an example. “The sum of the angles of any triangle is 180^{o}!” This can be proven, but only in a flat geometry! In a spherical geometry, the sum is larger and in a hyperbolic geometry it is smaller. But we do not know, which geometry applies in nature! Until Einstein, it was generally assumed, that space would be flat. Einstein in his General Theory of Relativity showed, that this is not the case – much to the surprise of most physicists at the time. Consequently, mathematical results cannot be applied to nature without further inquiry.

In the context of mathematics it is better not to use the notion of “Truth”! Rather, a flawless mathematical result should be called “correct”! 2+2=4 is correct, 2+2=5 is mistaken and has to be corrected. “Truth” – in my language – requires personal support, it is not automatically intersubjective.[2]

This opens the question whether the laws of nature express some kind of truth as opposed to the purely formal theorems of mathematics?

Let us collect what we have said about both of these notions:

- **Correct** is what is formally proven (free from contradictions).
- It is always relative to an assumed set of axioms

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[1] Einstein, Albert: Address on 27 January 1921 at the Prussian Academy of Sciences in Berlin on *Geometry and Experience.*

[2] Details in Pietschmann, Herbert: Phänomenologie der Naturwissenschaft. Eur. Univ. Press, Vienna 2007. See also Pietschmann, Herbert: Truth or Knowledge in Physics. In: What is Truth? (Eds: H. Hashi & J. Niznik) Conf. Proc. Vol 9, Pol.Ak.Sci (2011) S. 21-26.

- Proven theorems of mathematics are correct.
- **True** is what I do not doubt (although I could)
- It requires personal involvement
- Personal believe (religion and/or trust)

But the laws of nature do not need any personal involvement; they are independent of trust or believe! Granted that they cannot be proven formally. They may even be shown to be false after a change of paradigm! So it seems, that they neither coincide with one of the extreme concepts “correct” or “true”, nor do they fall somewhere in between.

In order to find out about the nature of physical laws, we will now turn to the history of the origin of the scientific method.

As early as 1436, Nikolaus von Kues, Cardinal at Brixen, noted that the calendar seemed to deviate from the experienced cycle of seasons. That was an important issue, because the day of Easter was calculated according to the calendar which still stemmed from Julius Ceasar. Thus the date of Easter could therefore be incorrect! Nikolaus von Kues sent a paper called “de correctione calendarii” to the Council of the Church which was held in Basel at the time. In this paper, he already suggested that it might be necessary to assume, that the sun is in the centre of the world and the earth and all other planets (except the moon) rotate around it, in order to simplify the calculations necessary for the correction of the calendar.

Let me mention in passing, that Ceasar’s calendar makers knew about the necessity of a leap year every fourth year, but they did not know that the leap year should be jumped every hundred years. This small error had accumulated over one and a half millennia to be observable at the time of the Council in Basel.

The paper of Nikolaus von Kues was apparently neglected. But in the following century, Nikolaus Copernicus took up the subject and this time it was taken seriously because the correction of the calendar seemed unavoidable. 1542 the book of Copernicus was published and 40 years later the reform of the calendar came into effect. Pope Gregor 13^{th} declared that October 4, 1582 had to be followed immediately by October 15, so that 10 days were left out.

It is often assumed, that the church was in total opposition to the world view of Copernicus. But this is not correct, because the church was in need of the simpler world view of Copernicus in order to be able to correct the calendar. Owen Gingerich,

Professor of Astronomy and History of Science at Harvard, writes:[3] "Copernicus' book was considered an important contribution to the reform of astronomy, on which the calendar and the accurate determination of the date of Easter depended."

However, there was an obstacle! From several quotations of the Holy Script people inferred that the earth was motionless and the sun was moving.[4] To avoid an obvious contradiction, the church introduced the distinction of "truth" and "hypothesis". Whenever the truth was challenged, heavy measures were taken by the inquisition. But anybody was allowed to propose a hypothesis, for an hypothesis was only judged by its usefulness, it was considered to be intrinsically false for it did not refer to the whole but only to parts. With respect to Copernicus, Cardinal Baronius used to say: "The Bible teaches how to go to heaven, not how the heavens go."

But things were not always so simple! Many colleagues of Galilei were jealous and tried to denigrate him at the inquisition. So in 1616, the case had to be clarified. Galilei went to Rome, were his friend, Roberto Cardinal Bellarmino, was head of the inquisition. Galilei was only warned to be cautious, but the book of Copernicus was studied in detail. The result was rather simple. Cardinal Bonifacio Caetani was the responsible expert and he wrote in his judgment:[5] "If certain of Copernicus' passages on the motion of the earth are not hypothetical, make them hypothetical; then they will not be against either the truth or the Holy Writ. On the contrary, in a certain sense they will be in agreement with them, on account of the false nature of suppositions, which the study of astronomy is accustomed to use as its special right."

Thus the church introduced a basic distinction between Truth an Hypothesis! The latter were false by definition because they referred not to the "whole" but rather to a specialized part of it. They were judged only by their practicability and usefulness.

In the same year, the head of the inquisition, Roberto Cardinal Bellarmino wrote to Father Paolo Antonio Foscarini, a disciple of Galilei:[6] "First, I say that it appears to me that Your Reverence and Signor Galileo did prudently to content yourselves with speaking hypothetically and not positively, as I have always believed Copernicus did. For to say that assuming the earth moves and the sun stands still saves all the

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[3] Gingerich, Owen: The Galileo Affair, Scientific American (August 1982) p.124.

[4] Josua 10,12f; 1 Chronik 16,30

[5] Gingerich, loc.cit., p.124.

[6] Gingerich, loc.cit., p.123.

appearances better than eccentrics and epicycles is to speak well. This has no danger in it, and it suffices for mathematicians."

But Galilei was not satisfied. He accepted the distinction between truth and hypothesis, but he could not accept that all hypotheses were equally false. He said:[7] "I should not like to have great men think that I endorse the position of Copernicus only as astronomical hypothesis which is not really true."

In this way, modern science (which Galilei called "nuova scienza") was born! Galilei searched for a method to distinguish between Copernicus and Ptolemy. He found it in the phases of the Venus, which he had discovered by applying the Dutch telescope to celestial phenomena. He calculated their course according to Ptolemy and Copernicus and compared the result with his observation. When he discovered that the prediction according to Copernicus agreed with his observation, but not the prediction of Ptolemy, he could insist, that the two hypotheses were not equally false! He did NOT claim to have shown that Copernicus is TRUE, but he called it KNOWLEDGE about nature!

Galilei claimed:[8] "I do not feel obliged to believe that the same God who has endowed us with senses, reason, and intellect has intended us to forgo their use and by some other means to give us **knowledge** which we can attain by them."

The birth of modern science!

- Galilei observed the phases of Venus
- Calculated their course according to Ptolemy and Copernicus
- Compared with observation
- → Ptolemy is wrong!!! → Copernicus is <u>confirmed</u>, although <u>not proven</u>!

[7] Galileo Galilei: Letter to Castelli, 21. Dez. 1613.

(A. Favaro: Le Opere di Galileo Galilei. Ed. Nazionale (1890-1909) V, p. 281).

[8] Galilei, Galileo: Letter to Cstalli from Dec. 21, 1613.

From now on, the criteria for knowledge about nature were defined by experiment. An **experiment** – according to Galilei and valid until today – is based on three requirements:

- It must be reproducible
- Results have to be given quantitatively
- It can be applied only to simple systems

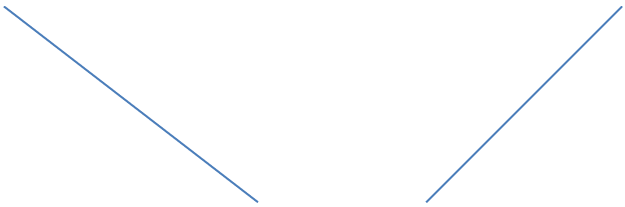
We can now turn back to the distinction between "correct" and "true" and ask about the nature of scientific knowledge. First of all, let me repeat that laws of nature are not "correct", neither in the sense of mathematics (they cannot be proven) nor in the sense of common language. Formally, they are often even wrong! Let me take as an example the first law of Kepler: *The orbit of every planet is an ellipse with the sun at a focus.* But striktly elliptical orbits do not exist in the real world! For the law applies only to a simplified version of our world, i.e. to a world, in which there is only one sun and one planet. The power of science lies in the fact, that we start from idealised, simplified "models" of our world and – in successive approximations – approach the real world to the extent that is required in a specific case. For a first orientation, Keplers law is sufficient. If we want to send a spaceship through the planetary system, we have to use the most powerful computers to do the necessary corrections. So we conclude, that physics does not describe the world in which we live, but constructs a simplified version which can be improved step by step.

But laws of nature do not require personal involvement either, i.e. they are not „true" in our sense of the term.

I claim, that laws of nature fall in a **third category** which I call "certain"! Laws of nature are „certain" in the sense that they allow successful „checklist behaviour"! A checklist is a list of simple actions which – when correctly executed – lead with certainty to a definitely predicted result. A good example is aviation! An airplane is always flown according to a checklist and this is why we have achieved such an impressive state of technical security in commercial aviation! Science does NOT aim at truth, but at **certainty of knowledge**! That may be even more useful and gratifying, but it should not be confused with truth.

Thus we have a triangle of notions:

CORRECT	TRUE
Can be proven	Can be doubted



CERTAIN

Can be falsified

The success of the scientific method led to a very special kind of thinking which governs our society: **Mechanistic thinking**. It is based on four principles; thus it is simple and generally applicable.

- MEASURE EVERYTHING (Galilei)
- BREAK EVERYTHING TO SMALLEST PIECES (Descartes)
- ALWAYS EITHER OR (Aristotle)
- ALWAYS FIND A CAUSE (Newton)

Let me mention in passing, that meanwhile this mechanistic thinking had to be taken over by many other cultures in order to compete with our technical and economic advantage. But in these cultures, it has been adopted besides their own way of thinking and not – as in western culture – as the only reasonable **frame of thinking**![9]

It is not my aim to criticize our frame of thinking! Like everything we meet in our world it has advantages and disadvantages; we should not raise the question whether it is good or bad for that is too crude a way of thinking. Rather, we should ask the question in which realm we accept the disadvantages for the benefit of the advantages and where the disadvantages are so overwhelming that we have to renounce the advantages. This is much more cumbersome, for the line between the two realms depends on persons and circumstances, so that an agreement has to be reached by discourse and discussion.

For that reason, let me begin with the obvious advantages of the mechanistic frame of thinking. It allows for what I call the **checklist-behavior**.

[9] See e.g. Makoto Kikuchi: Creativity and Ways of Thinking: the Japanese Style. Physics Today, Sept. 1981.

A checklist is a list of simple actions which – when correctly executed – lead with certainty to a definitely predicted result. It is the astonishing grade of security in aviation which we have reached over the time because of this checklist-behavior. In a cockpit there is the strict rule that nothing may be done which is not listed on a checklist! Since this is the root of our mechanistic way of thinking, let me show a short example of the so called “Boeing normal operations checklist”.

Pre-Start Checklist

- Parking Brake..... SET
- Throttle ..... IDLE
- Fuel Flow.....CUTOFF
- BATT Master Switch ..... ON
- Panel Lights.....ON if required
- Hydraulic Pump Switches ..... ON
- Landing Gear Lever .....CHECK DOWN
- Flaps .....UP
- Spoiler .....RETRACTED
- APU..... START/CHECK RUN
- APU Gen .....ON/CHECK VOLTS
- Fuel Quantity.....CHECK
- Pitot Heat/De-Ice.....OFF
- Aircraft Lighting .....OFF
- Flight controls ..... FREE AND CORRECT
- Passenger Signs .....OFF
- Check Weather ..... Atis, Flight Services

- De-Ice .....TEST/CHECK

Following a checklist does not require responsibility but carefulness! In that sense, a pilot does not have any responsibility since he or she has to strictly follow a checklist. This great achievement has obviously been applied in many other fields, for example in high-tech surgery.

But mechanistic thinking is the frame of our thinking in general. Everywhere too many of us are surging for "mechanisms". Let me give you a list of cases where I have found "mechanisms" in areas where they strictly should not belong.

- *Mechanism* of Evolution[10]
- Neuronal Synchronization as Mechanism[11]
- psychic *Mechanism* of Integration[12]
- God is not a supernatural force, but is instead a Mechanism governing motivation[13]

The respectable journal "Scientific American" dedicated its volume of October 2012 to the general topic "The Language of the Brain". The subtitle reads: „How the world's most complicated machine [!] processes and communicates information"

A critical line is passed in atomic physics, when mechanistic thinking becomes more important than to be correct! Most of us have learned in school that the atom is kind of a planetary system with electrons orbiting the nucleus like planets and the sun. This was the last attempt at a mechanistic model of the atom in 1913. But we know since 1926 that it is nonsense! The uncertainty principle of Quantum Mechanics teaches us that orbits in an atom are impossible! (Also the angular momentum in this model is wrong!). Quantum mechanics has taught us that the mechanistic frame of thinking cannot even describe the atom or matter in general!

In quantum mechanics the mechanistic frame of thinking fails because the whole (e.g. the atom) is different from the sum of its parts (nucleus plus electrons), complementarity teaches us that "either-or" is not applicable in quantum mechanics

[10] Dobler, Susanne: Interview in the paper „Die Welt" in the Darwin year 2009.

[11] Forschungsbericht 2008 des Max-Planck-Instituts für Hirnforschung in München

[12] Plänkers, T.: Die Angst vor der Freiheit – Beiträge zur Psychoanalyse des Krieges. Tübingen (1993) p.53.

[13] Taken from a discussion in the Internet.

and not every event has a specific cause.[14] Nevertheless we learn nonsense in school for the simple reason that it fits into the mechanistic frame of thinking.

In spite of – or maybe because of – this very reduction of "understanding" to "mechanistic thinking" the above differentiation between certain, correct and true becomes blurred. To repeat: Science does NOT aim at truth, but at certainty of knowledge! That may be even more useful and gratifying, but it should not be confused with truth. Even Voltaire, the great master of enlightenment, confused Truth and Certainty when he wrote in a letter of November 15, 1732 to the physicist Maupertuis: "Your first letter baptized me in the Newtonian religion, your second gave me my confirmation. I thank you for your sacraments."

Let me conclude with another quotation from Albert Einstein:[15] "Physics constitutes a logical system of thought which is in a state of evolution, whose basis (principles) cannot be distilled, as it were, from experience by an inductive method, but can only be arrived at by free invention. The justification of the system rests in the verification of the derived propositions by sense experiences."

Herbert PIETSCHMANN
Professor Emeritus, Faculty of Physics,
University of Vienna
herbert.pietschmann@univie.ac.at

[14] For details see Pietschmann, H.: Quantenmechanik verstehen. Berlin (2003), or any other textbook on quantum mechanics.

[15] Newton, Roger G.: How Physics Confronts Reality. Singapore (2009) p.41.

The significance of the meeting of BCA and KoPhil at the Univerisity of Vienna

Board of the *KoPhil* ,
Association of Comparative Philosophy and
Interdisciplinary Education (Vienna/Austria)

"Once in encounter, once in a life time"

The plan for the meeting of BCA and *KoPhil* at this University of Vienna started in May 2015. The wish came from the BCA. Since the main representative of the BCA cannot visit Vienna this time, we, the board of the *KoPhil*, will reflect on the significance of this meeting. Just in one phrase, that is: "Once in encounter, once in a life time". This quote refers to a famous state in Zen Buddhism. Let us share the significance of this thought: Each meeting is once "in encounter" in a life time, based on a certain [time-place-situation]. Even if the meeting may take place in the near future again, each occasion takes place only once in a life time, referring to a [*certain situation, certain time-space, certain relationship*]. Each occasion has thus a special and unique value.

BCA history and its ideal in outline

The start of the closer contact between KoPhil and BCA was at the symposium of Prof. F. Wallner 2013 at the Freud University in Vienna. We met the representative of BCA, colleague K. Khroutsky. His lecture informed us about the background of BCA Russia. The association encourages a highly interdisciplinary thinking and various systems of scientific thought can exchange their ideas in its center in Russia. A particularly important person for the BCA was Pitrim A. Sorokin, the social scientist that emigrated to the USA in the 1920s. I am not specializing in his work, but I am able to sketch the aim of the BCA based on a public presentation of K. Khroutsky in 2014:

-Sorokin as a social cultural scientist developed a structuralism based on the "triadologic" components in his work *"Social and cultural dynamics"* (1937-1941 in the USA): "Sensate" and "Ideational" components are shown in a "dualism" and the third one, the "Integral" component, intermediates the dualistic Two, whereby a

constant and dynamic cycling of the energetic status of each component is actualized for an evolution of a human society.

-Based on Sorokin and several other scientific concepts, the BCA fosters a cosmology by the "integral" principle leading to a "biocosmology" underpinned by a "triadic" view: "Mathematical-physicalist, Organicist, and Integralist". It thus addresses the life-world, micro-world and macro-world.

-By this "integralist" position there arise a number of re-interpreted new "Aristotelian" positions, called the "neo-aristotelism" as a "super system of all-encompassing knowledge".

The significance of the meeting of BCA and KoPhil

From this perspective, the BCA may be seen as a supervisor of an "integralist" view aiming towards a super-system. This is reviewed cautiously from the perspectives of *many Systems of philosophy and protected* by *criticism of various kinds*. The BCA fosters *philosophical dialogues between various scientific and philosophical subjects.* This dialogical focus should be actualized *between philosophers and scientists of different disciplines*. This common ground of the meeting of BCA and *KoPhil* at the University of Vienna may be more concretely elaborated by the following points:

- This meeting in Vienna is placed in the historic topos of highly developed sciences and philosophy of the 20th Century. *A spirit for liberty in thinking, researching and teaching* based on several *interdisciplinary streams* is still present in several faculties.

-The *dialogue culture* between philosophy and different scientific disciplines has an "open court" for discussion, *inter-action* and *intra-relation*, focusing on a certain theme which is *shared by different disciplines*. Philosophy has the role of i*ntermediating and trans-stimulating* opposing positions to the *dialectic* and *integrative state* step by step.

-The way of comparative thinking is *liberal and dialectic*. It is ***never*** bound *to dogma or self-centralized ideology.*

The aim of Comparative Philosophy is to foster the philosophical and scientific reflection that everyone *aims* towards thinking and acting in a way of a holistic *embodied cognition,* borne by one's own real and intellectual life. This position works as a manifested ideal in the middle of the reality of the world day by day. It is never absolutized. It is a self-realizing station of *embodying ideal,* the constant act of striving for enrichment and completion of one's own philosophy and science in the following spirit: "*to serve and contribute the real and intellectual time and space in a contemporary world*".

Interdisciplinarity in the late 20th century and its contemporary situation

A firm construction of a certain discipline of a certain science or certain genre of philosophy was characteristic for the 1970s and 1980s. Each scientist was protected by his or her own genre, own school, own scientific discipline. The encounter of the representatives of two different disciplines often showed tense debates in which each representative spoke from a completely different position, based on different terminology and for the other party incomprehensible principles. It resulted a "*Field of Isolation*". Physicalism was one of the main streams at these decades. Put differently, it represents a natural scientific Absolutism, natural science Centralism.

This tendency has been resolved continuously since the begin of the 1990s to the begin of this century. Special genres of Philosophy or of Human Science with their firm constructs of logics have been dissolved in the *surface of the worldwide digital networking*. The previous situation of "isolated fields" of special scientific genres seemingly has ended. On the other hand, another kind of Absolutism, Dogmatism or Centralism of one's own scientific position has come to the fore. The networking fields are linked from one to another, but only in a superficial formality – the contents of each thing often become superficial, aiming to getting popular as fast as possible – a continuous development of creative things may not be possible anymore.

The total connection through digital networks surely is conducive to distribute compact information of the highest quantity between humans without dependence on a certain geographic location. However, the downside of this situation is consciously neglected: The users of the IT networks, humans with mind and spirit and with the competence to create real things for a real world, actually may disappear as living beings in a real human community. In the main stream of Computer Science there is

an emerging New Centralism situated in the midst of Cognitive and Applied Natural Science and Technology.

What can we do in a contemporary world as a scientist or philosopher?

The method of Comparative Thinking is one of the most suitable ways to overcome this chaos. Comparative Philosophy, the aim of our Association of *KoPhil*, is a field with a number of possibilities for networking, joint projects for researchers who are oriented to creating their own philosophies beyond the limits of previous genres or schools. Its beginning was in the middle of the decade of 1950 in the USA. It spread to East Asia in the early 1970s, as well as to many pan-pacific world regions. Several researchers of intercultural philosophy, which arose in the late 1980s in Europe, stated that Comparative Philosophy lacks a method; it constitutes only a surface comparison; it lacks a firm conceptual underpinning; and so on. The different opinions of various representatives of these two philosophical streams are not the theme of this symposium. In the process of establishing this Association I have put forward this opinion: The Comparative Thinking is a firm principle and method that executes the following way step by step.

1) We, the thinking ones, take a position *between* the different thinking systems of [*A*] and [*non-A*] in aiming towards the comparison of a certain theme, which is similar for both systems of [*A*] and [*non-A*].

2) We reflect on the dimension of [*A*], considering the [*non-A*] from the position of [*A*]. We collect the special aspects from [*A*], by which we execute a comparison between our previous knowledge and the so far for us unknown aspects of [*A*]. It should not remain a brief description of "Common and different components between our knowledge and [*A*]", but an integration, which emerges between [*ours and A*], should develop.

3) With this result we exchange our position from the system of [*A*] into the system of [*non-A*]. Whereas our basic knowledge is enriched by [*A*], and the [*A*] is now more familiar for us, the [*non-A*] shows a number of different components between us and [*non-A*] itself. We collect the new components of [*non-A*], execute the comparison of our knowledge and the unknown aspects of [*non-A*] in purpose of getting an integration.

4) We return to the position between [*A*] and [*non-A*], but highly enriched because of the processes of 2) and 3). We reflect the integrative knowledge of 2) and 3) comparatively.

5) The process 4) offered us a more intensified comparison between 2) and 3). It may include a contradictory component. If there is a contradiction, we take our position in the middle of the contradictory problem: We place ourselves and the contradictory problem in the "*Field of Between*".

6) If there is a difficult point which cannot be solved, the processes of 2)-3)-4) can be repeated with the main point of the difficult problem.

7) In execution accompanied by cautious view, careful thinking and handling, we, the thinking humans, build our own thinking system step by step, based on the principle of "The Field of *Between"*.

Conclusion – The actualizing of the Field of Between

In execution of the components 1)-7), the principle of the "Field of Between" is *embodied by the thinking and acting human being*. It is an "Embodied principle" for transmission between and integration of Theory and Practice. In this state, the comparative thinking method of "The Field of *Between*" achieves an *intermediation* of the [acting in the intellectual and real world dimensions]. For example:

A thinking human that sticks to a rigid dogmatic in his/her own thought, rejects every other position that cannot be identified or conformed with his/her own; such a position is a "*Field of Isolation"*. From such a position of various "mutual rejections" cannot result any productive working. The principle of the "Field of *Between"* shows *a way of healing*: We, the thinking and acting humans, situate ourselves *between* our and the isolated position of that representative of dogma. One may stick to a dogmatic position oneself so that a meaningful dialogue would hardly be possible. However, the spirit for "transmission" bears a true sincerity to enable philosophy and sciences to grow in a pure relational mind *that is free from one's own ego* and *one's sole focus on one's own profit.*

The principle of the "Field of *Between*" serves this spirit. This spirit is based on Compassion for the execution of a meaningful togetherness.

Let us summarize the result of this discourse on the principle of “The Field of *Between”*:

-It enables a *flexible and dynamic thinking* that is *free of ideology and dogma*

-Based on Comparative Philosophy it has great value in critically reflecting and constructing one’s own thinking system. It works as the [*Third station*] in regard on one’s own critical mind in the “open court” for *interaction and intra-relation between one and another*, [*A*] and [*non-A*].

“*Once in encounter, once in a life time.*”

We hope that several meaningful sessions and discussions will be realized at the symposium on the next days.

Board of the *KoPhil*
http://kohil-interdis.at

Zhu Xi's Natural Knowledge and Philosophy of Nature

Vincent SHEN (Toronto/Canada)

I. Introduction

The function of reason has been much emphasized and cherished by traditional Chinese philosophers. Of none was this truer than Zhu Xi (1130-1200), a great Chinese philosopher in Song dynasty, who built up a rationalist comprehensive system of philosophy. Zhu Xi was very interested in natural knowledge at the same time as possessing a critical and systematic thinking. He can therefore serve as a typical example for us to analyze traditional Chinese philosophy's attitude towards natural knowledge, and how such knowledge relates with the transcendental perspective of things. Zhu Xi lived in the 12th century, therefore in mediaeval times, yet a little earlier than those great mediaeval Western thinkers such as Robert Grosseteste (1175-1253), Roger Bacon (1210-1292), Albert the Great (1200-1280), St. Bonaventura (1217-1274) and St. Thomas of Aquinas (1225-1274). With this in mind, we should try not to view Zhu Xi's natural knowledge through the critical lens of Western modern science, but rather look for those universalizable elements that are implied in his natural knowledge of 800 years ago.

Zhu Xi made himself aware of much of the natural knowledge that existed at his time. He was familiar with the works of Shao Yong (1011-1077), Su Song (1020-1101), Shen Gua (1131-1095), Cai Yuanding (1135-1198)…etc., who wrote on calendrical astronomy, botany, meteorology and other domains of natural knowledge. Zhu Xi's own *Wenji* (*Collected Writings*) and *Yulei* (*Classified Discourses*) display his rich knowledge in these realms and others such as music and harmonics, geomancy, medicine, etc. He also liked to discuss natural phenomenon with his disciples and with visitors. From the perspective of history of science, some of Zhu Xi's scientific knowledge and hypotheses were held in high regard by historians of science such as Joseph Needham. That being said, Zhu Xi himself looked beyond the technical dimension of such knowledge and sought a deeper understanding of nature

by inquiring into the principles of things and building up a holistic vision of reality. In other words, Zhu Xi's interest was in the philosophy of nature rather than the technical dimension of natural knowledge.

Before we start to discuss Zhu Xi's natural knowledge, a few preliminary distinctions need to be made. First, concerning our first-hand materials, that is, Zhu Xi's writings on which our analysis is to be based, we should make the distinction between his *Classified Conversations* and his *Collected Writings*. There are scholars who take these two works to be of equal value and base their studies on the *Classified Conversations*. For example, *The Natural Philosophy of Chu Hsi (1130-1200)*, a work by Yung Sik Kim, minutely analyses Zhu Xi's texts, using the *Classified Conversations* more than the *Collected Writings*, to determine Zhu Xi's basic concepts of natural philosophy and his knowledge of the natural world.[16] To this end, Kim has used textual analysis and classification of terms in the *Classified Conversations* and elaborated the Yin-Yang Associations, the Five Phases Associations, the Common Trigram Associations, the Four Cosmic-Quality Associations…etc.

It is true that the *Classified Conversations* show that Zhu Xi's conversations with his disciples and visitors quite often led into discussions about natural knowledge. When explaining his concepts of *li* and *qi*, nature and principle, spirit and ghost, and when making comments on classical Confucian scriptures, personages or events, he used his natural knowledge to interpret the meaning of scriptures, and took natural phenomena as metaphors to illustrate his philosophical ideas. Since very broad subjects were treated in the *Classified Conversations*, this book is very valuable to us in understanding Zhu Xi's teaching activities and in discerning the background knowledge presupposed by his philosophy and it is in these respects that we will refer ourselves to this work.

However, although the *Classified Conversations* does offer us quite a lot of useful materials, I myself would hesitate to take it as the object of textual analysis in looking for evidence of Zhu Xi's natural knowledge. On the level of textual composition, the *Classified Conversations*, as recollections of dialogues recorded by Zhu Xi's disciples and visitors, has less value than those texts included in the

[16] Yung Sik Kim, *The Natural Philosophy of Chu His (1130-1200),* American Philosophical Association, Memoirs Series, Vol.235, 2000. xii + 380 pp.

Collected Writings, for which Zhu Xi himself was responsible. The *Classified Conversations*, which is comparatively loose in structure and less careful in wording, and which is not exempt from the errors and false memories of disciples and visitors' records, should not be attributed, as to authorship, all to Zhu Xi and therefore it is less suited for use in textual analysis for the purpose of deciphering Zhu Xi's own thought and knowledge than the *Collected Writings*, where textual composition is rigorously well-structured and where every discourse and wording was weighted and deliberated by Zhu Xi himself before being released to the public.

Furthermore, we have to distinguish between what is knowledge and what is a guess or belief. For pedagogical reasons, Zhu Xi's answers to students in the *Classified Conversations,* as well as being more occasional, were more a matter of guesswork than knowledge. For example, we could find him saying in the beginning of heaven and earth, there was nothing but *yin* and *yang* and that their interactional grinding produced many dregs, which were later accumulated as earth in the center. [17] For me, this, though it contains in itself Zhu Xi's cosmological hypothesis and his metaphysical theory of *qi*, could at best be seen merely as a guess or belief. Yet, on other occasions, Zhu Xi proposes some scientific hypotheses with certain rigorous arguments and empirical verification, such as when he says, "mountains were formed by the elevation of the sea bottom", and then proceeds to prove them by, in this instance, the presence of seashells on top of the mountain." [18] These kinds of propositions verified by empirical data might be seen as scientific knowledge, rather than mere guess or belief.

We also have to distinguish between the times when Zhu Xi uses nature as metaphor and those when he discusses his knowledge of nature. For example, when Zhu Xi says that "studying" is like the "burning of fire", he is not discussing his knowledge of fire itself but using the metaphor of fire to illustrate the process of

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[17]Zhu Xi, *Zhuzi Yulei*(*Master Zhu's Collected Conversations*), Chapter 1, edited by Li Jingde, punctuated and proofread by Wang Xingxian, Beijing: Zhonghua Bookstore, 1999, Vol. 1, p.6. (hereafter referred as Zhonghua edition) More elaboration on this point to be found in next section.

[18]Zhi Xi said, "On high mountain there were quite often seen shells of oyster and shellfish in the rocks. These rocks must be earth in ancient times, and those shells from oysters and shellfish in the water. The lower becomes the higher, the softer become the harder. This phenomenon is worthy of pondering upon, for these facts can be verified." *Zhuzi Yulei*, Chapter 94, in Zhonghua edition, Vol. 5, p.19

studying. Zhu Xi says, "Studying is like practicing alchemy. At the start one should smelt with a hot fire. Afterwards one should feed it gradually with a slower fire. Studying is also like cooking things. In the beginning one should boil them with a hot fire, to be followed with a slow fire. Similarly, when we study, we should start with diligence, hard work, careful inquiry, then we should slow down to appreciate and ponder, to flavor back and forth, and the meaning of things will come out by itself."[19] Here Zhu Xi uses "fire" and "alchemy" as metaphors to discuss the process of studying and was not taking "fire" and "alchemy" as his objects of discussion, much less describing them. Therefore, Zhu Xi's knowledge of fire should not be read out of this kind of metaphorical use of language. Metaphor, which allows us to see X as Y, should not be considered as a kind of description of X. This should always be kept in mind when we read Chinese philosophical texts.

In summary, in the discussion of Zhu Xi's natural knowledge, we should make the distinction, as to the use of first-hand materials for textual analysis, between the value of Zhu Xi's *Collected Writings* and his *Classified Conversations*. Also in reading his texts, we should distinguish between knowledge and guesswork, metaphor and description, in order to read out his natural knowledge and philosophy of nature.[20]

II. Zhu Xi's Natural Knowledge and his Scientific Attitude

The reason that we take Zhu Xi's natural knowledge as an exemplar case for analyzing traditional Chinese natural knowledge and the relation between science and religion is that human curiosity about Nature may lead human beings to go out side of themselves and go towards the other, even to the Ultimate Other. Let me elaborate: what I mean by "the other" could be "other persons", "Nature as the other", or the "Ultimate Other", thus it is in fact "many others" in my own terms. For example, if one sees none of the many others but oneself in one's own eyes, taking one's own mind as the measure of all things and one's subjectivity as absolute judge, then there will be no need to become curious about Nature and therefore no need of natural

[19] Ibid., Chapter 114, in Zhonghua edition, Vol.7, p.2766

[20] And it is precisely on these three points that I see there might be problems in Yung Sik Kim's *The Natural Philosophy of Chu Hsi(1130-1200).*

knowledge. Also, if one pays no respect to other persons, there will be no ethical dimension in one's own life. If one doesn't open oneself to the Ultimate Other, then even if one has some religious feeling, this will not endure long before falling back into self-enclosure. Even if our natural knowledge comes from our curiosity about Nature and our openness to nature as one major part of the many others, still our scientific rationality could content itself in the construction of a self-sufficient system, in which human would live in self-enclosure without being unceasingly open to the Ultimate Other.

Zhu Xi's interest in natural knowledge was motivated philosophically by his idea that everything in the universe had its own principle (*li*). His concept of *li* meant principle, reason or order…etc, existing in all things. He said, "Up to the level of the Ultimate Infinite, the Great Ultimate, down to the tiny existence of one herb, one tree, one insect, each has its own principle…if there is one things not yet investigated, then we are still in lack of the principle of that thing."[21] Philosophically, Zhu Xi put his emphasis on the investigation of things and enquiry of principle. What he sought when he investigated and inquired were "the principles of heaven and earth, ghost and spirit, sun and moon, *yin* and *yang*, herb and tree, birds and animals."[22]

As mentioned above, Zhu Xi's vision of the formation, not to say creation, of heaven and earth belongs to his philosophical discourse of cosmology, not to scientific discourse of natural knowledge. From the point of view of science, Zhu Xi's propositions on these subjects could be seen at best as speculative hypotheses of a much higher level, or as kinds of "guesswork", rather than as natural knowledge. That being said, we can still discern some rationality in Zhu Xi's reasonable and critical corrections of some previously held doctrines, which could be seen as an expression of his scientific attitude.

For example, Zhu Xi thought that before the formation of heaven and earth, there was nothing but *yin qi* and *yang qi*, and that it was through the colliding and grinding of *yin* with *yang*, that they started to lead gradually to the formation of heaven and earth. Zhu Xi said, "In the beginning of heaven and earth, there was

[21] Zhu Xi, *Zhuzi Yulei*, chapter 15, in Zhonghua edition, Vol. 1, p.295

[22] Ibid., p.287

nothing but *yin* and *yang*. The movement of *qi* led to their grinding to and fro and when the grinding process became much quicker there were produced many dregs. Since there was no outlet inside, these dregs consequently formed an earth in the center, and those clear parts of *qi* became heaven, and then became sun and moon, and then became stars, all of them always turning in exterior and making circular movement around the earth. The earth is static in the center, not under the center."[23]

This world vision of Zhu Xi was a result of his metaphysical speculation, and should not to be seen as part of his natural knowledge. It implied a certain geocentric theory, quite similar to that of Aristotle and Ptolemy, very influential in the Middle Ages, in which the earth was taken to be the center of the universe. Yet Zhu Xi differed in the critical sense that for Zhu Xi, the earth existed in the center of heaven, which is constituted of *qi* and therefore non-substantial; in other words, the earth was at the center of an infinite universe, not the finite universe of Aristotle and Ptolemy.

In general, there were three theories about heaven in ancient China: the Covering Sky theory (*Gai Tian Suo*), the Floating Sky theory (*Hun Tian Suo*) and the Infinite Universe theory (*Xuan Ye Suo*). Zhu Xi sustained the Floating Sky theory in combining it with the Infinite Universe theory, while vehemently criticizing the Covering Sky theory. He accepted the Hun Tian Suo because this was already modeled in the armillary sphere of Zhang Heng. Yet he refused to accept the *Gai Tian Suo* because this could not be modeled and even if one tried to model it in the form of an umbrella, this wouldn't work because an umbrella could not cover the whole hemisphere and wind would leak from the uncovered parts. We can see this way of testing a hypothesis by whether or not it can be modeled as quite a rational way of thinking in itself. Zhu Xi said, "The armillary sphere (*Hun Yi*) is quite useful, whereas the *Gai Tian* theory should not be used. Just let the sustainers of Gai Tian theory imagine the form of its covering sky, how should it be? It must be something like an umbrella, but you will not know how it could be connected to the earth. As to the theory of *Hun Tian*, there at least you have an armillary sphere." [24] The footnote to this statement reads, "There are people who sustain the theory of *Gai Tian*, but we just don't know whether we can ask them to fabricate a *Gai Tian* model. Someone says

[23] Ibid., p.6

[24] Ibid., p.27

that it might look like the form of an umbrella, then there must be leak of wind on the four sides of the umbrella."[25] These texts show us that Zhu Xi took whether or not one could produce a rational model as a criterion of a good theory. The *Hun Tian* theory had produced the Hun Tian armillary sphere, but this was not true in the case of *Gai Tian* theory. Zhu Xi tended to think that even if the *Gai Tian* theory produced a model in the form of an umbrella, it would still not be plausible due to the fact that such a model would allow the wind to leak on the four sides of the earth.

Zhu Xi himself inherited the Hun Tian theory and modified the received hypothesis in a rational way. First, he accepted Zhang Zai's correction of the traditional version of this theory whereby Zhang Heng words that "the earth is floating on water", and "there is water in the surface of the sky", were substituted by "the earth is in the middle of *qi*". Although he took it for a fact that the earth was made of water, for him water, fire, etc. were all simply different manifestations of *qi*. He said, "*Yin* and *yang* are *qi*, yet the five phases are *qi*'s materialization. Things could be made because of these materializations. Even if there are five phases as material manifestations, there should be qi in these five phases to work in them in order to have all things done. But it is the *qi* of *yin* and *yang* which lies under these five. It is not the case that these five exist in addition to *yin* and *yang*."[26]

Second, Zhu Xi took "heaven" to be ever-turning *qi*, therefore the heavenly sky itself was not a substance. He said, "Heaven's form is round like a huge bullet, turning around from morning to night, its north pole and south pole are sliding in the sense that its high pole is in the behind and its low pole in the front. That is why its central axis itself is not turning. That which turns is also without physical body, but turns like a vehement wind… turning without end, up and down unceasingly, this is heaven without any physical body. The earth is that which was the dregs of *qi* which cumulates into bodily form. Since it is constrained in the turning movement of vehement wind, it floats immovably in the air enduringly without falling."[27] Thus Zhu Xi explains his geocentric theory. Although his explanation of why the earth does

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[25] Ibid.,

[26] Ibid., p.9

[27] Zhu Xi, *Chuci Jizhu*(Collected Commentary on Songs of Chu State), Chapter 3, Taipei: Yiwen Publishing House, 1967, p.97

not fall down might not be plausible today, his theory about the non-substantiality of heaven is still quite believable. Zhu Xi's concept of heaven was admired by the historian of science Joseph Needham. According to Needham, the vision of the universe proposed by the Chinese since early days, as infinite space in which many stars float and drift, was much advanced than the substantialist vision of Aristotle and Ptolemy which had influenced Western astronomy for more than a thousand years. Joseph Needham says, "To such minds the discovery of galaxies other than our own would have seemed full confirmation of their beliefs. Finally Chu Hsi gave to these views his great philosophical authority—the heavens, he said, are bodiless and empty (*thien wu thi*)."[28]

Zhu Xi also studied the phenomena of solar and lunar eclipse. He criticized the view, launched in the past by Don Zhongshu (179-104BC) in Han Dynasty, that eclipses were abnormal disasters. Contrary to this, Zhu Xi proposed that in the intercrossing of sun and moon in their movement, sunlight was covered by the moon and this account for the phenomenon of solar eclipse. As to the cause of moonlight and its phases, Zhu Xi followed the explanation given by Shen Gua, who, in his famous *Mengxi Bitang* (*Notes and Discourse on the Dream River*), said, "The moon has no light of its own. It's something like a silver disk, of which the light comes from sunlight." [29] Zhu Xi accepted this, commenting, "The moon is always round and has no eclipse in its form, but it's shining by receiving light from sunshine. The ancients believed always that the moon waxes and wanes, only Shen Gua is correct in saying that the moon itself has no waxing and waning." [30] Thus we see that Zhu Xi was quite clearly aware of the facts about sunshine and moonlight. Zhu Xi further made the distinction between the subjectively constructed "moonlight having waxing and waning" and the objective "moon itself as always round". As he says, "The moon itself has no waxing and waning, yet human beings see it as waxing and waning."[31]

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[28] Joseph Needham, *Science and Civilization in China*, Vol. III, Cambridge: Cambridge University Press, 1959, p.221. Note here Needham uses a system of Chinese spelling different from that of pin-yin. and that the Chinese characters for *thien wu thi* is 天無體。

[29] Shen Gua, *Mengxi Bitang* (*Notes and Discourse on the Dream River*), Proofread with interpretation by Hu Daojing, Vol. 1, Shanghai: Guji Publishing Company, 1987, pp.309

[30]Zhu Xi, *Zhuzi Yulei* (*Collected Conversations*), chapter 2, in Zhonghua edition, Vol. 1, p.19

[31]Ibid., p.19

Another of Zhu Xi's theories concerned the phenomenon of geological change. Shen Gua had noted, "Once I received a mission to Hebei Province. I traveled along Mount Taihang and among the mountain cliffs I had observed always many oyster shells and stones in the form of bird eggs, inserted extensively like a belt in the mountain walls. This says that there it was a seashore area in the old days, but now it's about a thousand *li* away from the East Sea, all that we call land today was immersed by turbid mud before."[32] Here, Shen Gua is not only expressing a sense of radical change, but also describing the geological phenomena of fossilization and sedimentation. It is reasonable to suppose that Zhu Xi had read about this and made further deductions by referring to his own experiences. Zhu Xi said, "On high mountains there were quite often seen shells of oyster and shellfish in the rocks. These rocks must be earth in ancient times, and those shells must come from oysters and shellfish in the water. The lower becomes the higher, the softer the harder. This phenomenon is worthy of pondering upon, now that these facts can be verified."[33] He elaborates on this when he says, "Now on high mountains there we find things like oyster shell embedded in the rock, this is a case of what was at the bottom before coming to be at the top now; oysters must have lived in the mud and sand, now they are embedded in the rock, and this is a case of the soft transformed into the solid. Heaven and earth is always in the process of becoming. How could it be that there is anything like permanence?"[34]

From today's perspective, these observations of Zhu Xi on the origins of mountains and seas and the phenomenon of crust movement are indeed very interestingly plausible. They show that Zhu Xi discussed the formation of oyster fossils and took their discovery in high regions as empirical verification of his theory about crust movement and land-sea change. Zhu Xi's emphasis on empirical verification reveals a certain scientific attitude, the merit of which was again recognized by Joseph Needham, who said, "As regards statements concerning the origin of mountains, Chinese literature proves unexpectedly rich materials…Zhu Xi recognized the fact that the mountains had been elevated since the day when the shells

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[32] Shen Gua, *Mengxi Bitang* (*Notes and Discourse on the Dream River*), Proofread with interpretation by Hu Daojing, Vol. 2, p.756

[33]Zhu Xi, *Zhuzi Yulei*, chapter 94, in Zhonghua edition, Vol. 5, p.19

[34]Ibid., p.19

of the living animals had been buried in the soft mud of the sea bottom."[35]

Concerning the phenomenon of sea tides, Shen Gua in the *Mengxi Bitang* had previously commented that, "Lu Zhao said that sea tides were stirred up by the rising and setting of the sun, but this is without any ground.…Once I have studied its periodical motion, and found that the tides come to high water when the moon makes its meridian transit. If you wait for this moment you will never miss it."[36] Zhu Xi, who was familiar with Shen Gua's ideas, agreed with him in criticizing the sun theory and also posited the moon as the cause of sea tides. As Zhu Xi says, "Sea tides have their permanent timing and momentum. In the old days I learned from someone from Ming Zhou who said that the tides were influenced by the moon. This is quite reasonable. Shen Gua also says so in his *Mengxi Bitang*."[37]

Besides, Zhu Xi also posited explanations of many meteorological phenomena such as wind, rain, thunder, lightning, snow, frost and dew. Among these, it is interesting to note his explanation of the hexagonal form of snowflakes: "The reason that snowflakes come out necessarily in hexagonal form is that when the hail in its process of falling down it is stricken by strong wind vehemently to the point of spreading out suddenly in a hexagonal shape. It is like a lump of mud was thrown on the ground and breaks into angular pieces. Also, six is a *yin* number. It's very much like the *Taiyin Xuanjing* stone which is also in hexagonal form. This is the natural number of heaven and earth."[38] Here Zhu Xi uses as analogy with the act of throwing mud to help in understanding the process by which hail is transformed into snowflakes. On the dynamic side, this could be seen as understanding a natural phenomenon (here, a snowflake) by using a dynamic model (throwing mud on the ground). As to its structural side, Zhu Xi uses a stone in hexagonal form to help understand analogically the hexagonal structure of a snowflake. Zhu Xi's use of dynamic and structural models or analogies to help in understanding natural phenomena has its element of rationality: although his explanation might seem very naïve from today's meteorological perspective, still we can see that his observation

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[35] Joseph Needham, *Science and Civilization in China*, Vol. III, p. 598

[36] Shen Gua, *Mengxi Bitang* (*Notes and Discourse on the Dream River*), Proofread with interpretation by Hu Daojing, Vol.2, p.931

[37] Zhu Xi, *Zhuzi Yulei*, chapter 2, in Zhonghua edition, Vol. 2, p.28

[38] Ibid., p.23

and reasoning have a certain rational merit.

Another example is Zhu Xi's explanation of the phenomenon of hailstone. Although sometimes he took as "reliable data" either narrated by morally trustworthy persons or recorded in books, thus there were discussions by him about whether the hailstone was produced by lizard, here is the "real philosophic reason" he gives to the production of hailstone: "This is because of the mutual responsive affection of *qi* that makes it so. It is precisely at the moment when *yin* meets *yang* and they strive one with another, that's why when hailstones fall it is necessarily cold. Now the two sides of a hailstone are sharp and angular. Supposedly in the beginning they are round, but when yin and yang meet and strive one with another, they are stricken broken like this. Etymologically, the Chinese word for 'hailstone'(雹) consists of the word 'rain'(雨) and the word 'contain'(包). This is because of the fact that a hailstone is shaped by the containing of rain by *qi*. That's why it is therefore named like this." [39] The above text makes it clear that, the explanation of hailstones given by Zhu Xi is in fact derived from his metaphysical theory of *qi*, or more precisely, his theory of "*yin-yang* interaction". This is why he says that the lizard belongs to *yin* gender and it is the mutual responsive affection of *qi* which makes the lizard produce hailstones. In general, his notions of "mutual affective response of *qi*" and "meeting and striving between *yin* and *yang*" refer to his concepts of *qi*, *yin* and *yang* in a more general sense and these form the conceptual scheme by which he explains the formation of hailstones.

In today's meteorological terms, the formation of hailstones is explained in the following way: a hailstone begins as a frozen rain droplet or snow pellet, carried upward by currents of warm air called updrafts. At the top of a cloud, hailstones freeze and attract more water, thereby getting heavier, and fall again to warmer levels, where their outside layers melt but are refrozen as a clear layer of ice when again carried to the cold top of a cloud. The hailstones continue to rise and fall, getting larger with each cycle, until they are too heavy for the updraft and therefore start to fall. We may take this process of rise and fall and the collision between warm cloud and cold cloud as a modern way of saying "the meeting and mutual affective response of qi" and "meeting and striving between *yin* and *yang*." In this sense we can say that Zhu Xi's hypothesis concerning hailstones, though expressed in obsolete terms, still

[39] Ibid., p.25

has its element of rationality. The problem for Zhu Xi was that, living in the 12th century, he could only use these vague and general terms which are relatively imprecise in their descriptive capacity; and that while he was right to trust trusting knowledge by acquaintance, it was easy for his rationality to be compromised under the influence of morally trustworthy persons and records in books.

III. Investigation of Things, Ultimate Reality and the Ultimate Other

Zhu Xi's interest in natural knowledge should be understood in the philosophical context of his notion of the "investigation of things to extend knowledge". For Zhu Xi, *li* or principle could be found in everything, and was worthy of investigation. According to my interpretation, the object of Zhu Xi's investigation of things was the principle existing out there in things, which presupposed, or contained an implicit recognition of, a certain "otherness" of many things and their principles.

As to the extension or attainment of knowledge, this should include both knowledge of self and knowledge of the other, either as a physical thing or as a person. Human beings should embark on the detour of knowing many others in order to return to one's self, with the aim of becoming transparent and enlightened; or put another way, one should return to oneself via the detour of many others, so that one might finally get sudden insight into the nature of things and attain transparent self-knowledge. The investigation of things starts with many things out there, whereas the attainment of knowledge would include knowledge of self and knowledge of many things, or better said, return to oneself via the detour of many others, so that one might finally get sudden penetration into the nature of things and attain transparent self-knowledge. In summary, Zhu Xi's "investigation of things" entails a process of detour by which one goes outside of one's self to many others and then, by knowing the many others, comes back to one's own self.

The fact that the human being is curious about things and there is a need for the investigation of things presupposes the existence of many others, and it is therefore not reasonable to reduce knowledge to contents unfolded totally from one's own mind. At first glance, the reason why human beings should approach many things in order to investigate their principles consists in the fact that principles themselves

are invisible while things are equipped with material form and thus easily visible. Therefore, we should inquire about invisible principles and have access to them through the mediation of visible things. As Zhu Xi said,

"The investigation of things is for the purpose of inquiring their principles. The fact that there is such a thing, implies necessarily that there is such a principle. Yet, principles are invisible and hard to recognize, and things have physical form and are easily visible, therefore we should inquire about principles through things. In this way, when principles are understood through our eyes and in our mind without any tiny distance, then we can cope with things without any error." [40]

However, during the process of knowing, there should be an unavoidable relation between things known and knowing subject, the knower and the known, which should not be reduced to the mere psychic activities of the knowing subject. Zhu Xi, being conscious of this, said,

"What we call knowing is in my mind, whereas what we call principles are in things and events. From myself here to know things over there, there must be the relation of subject and object, and in reading the Scriptures, we should not interpret that by this. If we interpret the 'investigation of things' merely as 'contact with things', then there is still something we do not understand about the ultimate truth. Everyone has contact with things, but some would contact them without investigating them, or investigate them carelessly without investigating them to the ultimate degree, therefore even if they are in contact with things, still they don't understand their principles. They don't know the reason why, the ought-to-be, of things. If you say that once we have contact with things and all principles are thereby exhausted, this is too easy to be possible."[41]

Since the relation between subject and object is not to be reduced, there should be first an act of going outside of oneself on the subject's part in order to have contact with many things as objects; yet, if there is only contact with many things without investigating their principles, the objective of attaining knowledge could not be achieved. Since principles need to be investigated in order to enter into our realm of knowledge, then in regards to things unknown and not-yet-knowing subjects, they must be in some way "the other" or imbued with some "otherness" in order to get

[40] Zhu Xi, *Zhuzi Wenji*(Collected Writings of Master Zhu), Chapter 13, proofread by Chen Junming, Taipei: Defu Foundation, 2000, Vol. 2, p. 409(Hereafter known as Defu edition)
[41]Zhu Xi, *Zhuzi Wenji*(Collected Writings of Master Zhu), Chapter 44, Defu edition, Vol.5, p.1969

themselves known. Therefore, the process of knowing is seen as a process of strangification. Thus, when Zhu Xi says that one has to "see things as things" (yi wu guan wu 以物觀物), he means, on the one hand, one should respect the objectivity and otherness of things under investigation; on the other hand, one should study the principle of that thing that make the way it is. In this sense, principle could also be seen as kind of "otherness". In short, we can call "things" as the "real other" or the "horizontal other", and we should go outside of ourselves to these things first in order keep in contact with them. As to "principles", they can be seen as a kind of "ideal other" or "vertical other", and we should make efforts to arrive at these by going beyond all kinds of particularity, materiality and concreteness in order to achieve universality, ideality and abstractness. That is to say, there are different layers or degrees of knowledge, and we should move through them from the shallow to the deep, from the superficial to the core, from the low to the high.

The most important concepts of Zhu Xi's philosophy are *li* (principle or reason) and *qi* (vital force). *Li* means reason or principle, while also serves as the common names for all principles, and the Great Ultimate in ancient Chinese philosophy is also interpreted by him as *li*.[42] Therefore, he has confused the three meanings of *li*: *li* as the Ultimate Reality, *li* as common name for all principles, and *li* as particular principles. First, on the physical level, each and every thing has its own particular *li*; on human and ethical level, *li* becomes human nature, and the five constant virtues are the *li* of human nature (humanness, righteousness, propriety, wisdom and faithfulness) which, when expressed, become those good feelings (of commiseration, of shame and dislike, of deference and compliance, of right and wrong…etc.). On this ontic level, *li* is very much like Aristotelian form, and it is here that is correct for Prof. Fung Yulan to interpret *li* in terms of the Aristotelian hylemorphism, that is, *li* as form, and *qi* as matter.

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[42] I accept, only partly, Brook Ziporyn's interpretation of *li* as coherence. "Coherence" touches upon the ontic and the general name aspects of *li*, or in other words, the logical and formal aspect of *li*. However, it does not touch upon *li* as the ultimate reality. For me, it is hard to conceive coherence as representing the ultimate reality, especially in its dynamic process, while Zhu Xi says it clearly that "the Great Ultimate is *li*," and that *li* could produce another universe. Cf. Brook Ziporyn, *Beyond Oneness and Difference: Li and Coherence in Chinese Buddhist Thought and Its Antecedents*, Albany: SUNY, 2013.

However, Zhu Xi's *li* is different from Aristotle's form in the sense that, for Zhu Xi, *li* is also the common name for all principles, and, moreover, li is also the Ultimate Reality; while for Aristotle, form is not the common name for all forms, and form also is not the ultimate reality. By contrast, Zhu Xi says also that the Great Ultimate is *li*, therefore li is also the Ultimate Reality, for it, all other *li*s are but different manifestation of the same Ultimate Reality–thus his saying that "The Principle is one, whereas manifestations are many--*li yi fen shu*(理一分殊)."

For Zhu Xi, *li* and *qi* are in very complicated relationship. First, *li* (principle, reason) is a metaphysical reality, whereas *qi* (vital force) is a physical reality, therefore they are different. Theoretically, *li* could exist without *qi*. Even when this universe is destroyed, another universe could be produced according to principle. Second, in its actual operation, *li* cannot be separated from *qi*. Altogether, they constitute all things in their concrete existence. As Zhu Xi says, "*li* operates by attaching itself to the *qi*" [43] Here, *li* and *qi* seem to be similar to Aristotle's hylemorphic concept of form and matter. Fung Yulan is right only on this level when he says *li* and *qi* are like Aristotle's form and matter.

It is a truism that we human should always go beyond ourselves and move towards many others out there, to investigate many things and to inquire about their principles. In this way, we are able to return to ourselves with self-understanding and thereby enlighten our own true selfhood. The vision that one can return to one's self through the detour of many others and achieve self-understanding through inquiring about the principles of many things, that one can ultimately attain sudden enlightenment by investigating one thing after another, presupposes that between principles of things and principles of mind there must be some co-naturality, interrelatedness and responsiveness. The principles of co-naturality, interrelatedness, and responsiveness, though cannot be done here due to shortage of space, should be seen as basic presuppositions of the compatibility, complementarity and communicability among difference principles and things. These are the basic presuppositions of Zhu Xi's philosophy. It suffices here to point out that, because of these basic presuppositions, Zhu Xi's tendency to reduce difference in the interest of unity is much stronger than his tendency to respect difference in itself or even to let the other just be the other.

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[43] Zhu Xi, *Zhuzi Yulei*, Vol. 94, in Zhonghua edition, Book 6, p.2376

IV. Zhu Xi's Naturalist and Non-Substantialist Vision of the Ghosts and Spirits

But, a question essential to our rethinking of Zhu Xi's thought remains: did his concern with nature and his curiosity about/respect for many others bring him to an inquiry of the Ultimate Other? As regards religious matters, Zhu Xi discussed the phenomena of ghosts and spirits (*guei-sheng*) and he was very concerned with and possessed of deep religious feeling. But the philosophical system he achieved under his core concepts of *li* and *qi* was more a system of immanence than transcendence. His interpretation of the Great Ultimate as *li* deprived his concept of the Ultimate Reality of Ultimate Otherness, though not without openness to it. Also he tended to explain the phenomena of ghosts and spirits by appealing to his theory of *qi*. Although we would not go so far as to say that Zhu Xi was without openness to the Ultimate Other, his rational system, finally, brought him to a self-consistent and self-reliant system of thought in which the Ultimate Other tended to be reduced rather than allowing Its ambiguity and unfathomability.

As to the problem of ghost and spirits, unlike common people who tended to see them as belonging to the order of Ultimate Reality, Zhu Xi saw them as only belonging to natural phenomena. Thus he treated them in a naturalist way, in explaining and interpreting their meaning by appealing to his theory of *qi*. For Zhu Xi, the phenomena of ghosts and spirits were but the growth and diminishing, stretching and contracting of qi according to the rhythmic change of *yin* and *yang*. As to the growth and diminishing of *qi*, he said, "Ghost and spirits are nothing but the growth and diminution of *yin* and *yang*." And, "Ghosts and spirits are but *qi*. Those which stretch and contract, come and go, are but *qi*." More specifically, the stretching of *qi* was spirit, whereas the contraction of *qi* was ghost: "Spirit (*shen*) means to stretch (sheng [a homophone]), whereas ghost means to contract."[44] In this sense, according to Zhu Xi, ghosts and spirits belonged to natural phenomena and should not be seen as supernatural, not to say the Ultimate Reality.

Further, Zhu Xi saw ghosts and spirits as more sophisticated phenomenon in the

[44] Zhu Xi, *Zhuzi Yulei*, Chapter 3, Zhonghua edition, Vol. 1, p.34

process of becoming of *qi*'s stretching and contracting, growth and diminishing, coming and going, movement and rest…etc. As he says,

"Wind and rain, dew and thunder, sun and moon, day and night, all these are traces of ghosts and spirits… they are either beings or non-beings, coming or going, concentrating or dispersing. Besides, there are cases in which one prays and is responded to, one beseeches and gets what one wants, and these are also called ghosts and spirits. The principle of them is all the same. All events in the world appear under the same principle, but they might be different in being sophisticated or raw, big or small."[45]

In general, we can say that Zhu Xi perceived ghosts and spirits as part of the principle of the becoming of *qi*. Instead of supposing ghost and spirits as sort of substances, he explained them in terms of the non-substantialist principle of *qi*'s becoming, saying that the concentration and dispersion of *qi* had its mysterious and sophisticated traces. The concentration of *qi* explained the emergence of life, whereas its dispersion explained the occurrence of death. The phenomenon of ghost could be understood as the returning of *qi* once concentrated and dispersed. Although *qi* had its period of concentration and its period of dispersion, the principle of its concentration and dispersion was always there and could be evoked to re-appear again. Zhu Xi even said that human descendants, through sincerity of prayer and ritual in sacrificial offerings, could feel and respond to the presence of the spirits of their ancestry. The reason for this consisted in the fact that the principle by which the *qi* of their ancestry once concentrated and dispersed existed always. By reason of their homogeneity and responsiveness, descendants could have mutual affective response with them because of the sincerity and piety of their sacrifices. Zhu Xi said,

"Human being and all things share the same *qi* under heaven and earth. When *qi* concentrates, there is human life; when it disperses, there it becomes ghosts. But even when *qi* is dispersed, its rhythmic change by *yin* and *yang* in the universe continues to reproduce itself unceasingly. Even if the spirits and souls of ancestry are dispersed, their descendants' souls and spirits still keep some resemblance with it. Therefore, when following the li of sacrificial offerings by doing them with sincerity and respect, the souls of ancestry could be reached. This kind of thing is hard to say. When we see it seemingly becomes nothing after having been dispersed, yet when one can do it

[45] Ibid., pp. 34-35

with the highest sincerity and respect, then one can still feel and reach them. The reason of this is that its principle exists always there."[46]

In short, there is the principle of concentration and dispersion of *qi*, but there is no substance of ghosts and spirits. Zhu Xi did not look on the existence of ghosts and spirits from a substantialist point of view. Instead, he took a non-substantialist position and explained them by his rationalist system of *li* and *qi*. For him, ghosts and spirits were but manifestations of the principle of concentration and dispersion, stretching and contracting, movement and rest, by which the homogeneous *qi* of descendants could reach and render re-stretched the once dispersed qi of their ancestry with their sincerity and respect.

Concerning whether or not there is a spiritual ruler of heaven and earth, Zhu Xi took the same non-substantialist position. He did not presume the existence of a spiritual divine substance governing the whole universe. Someone once asked him, "Is the Mind of heaven and earth spiritually intelligent or not? Or is it merely there apathetically taking no action?" Zhu Xi answered, "We should not say that the Mind of heaven and earth is not spiritually intelligent, but we can just say that it does not think and deliberate as human being does." [47] On the other hand, Zhu Xi took *li* as the Ultimate Reality, and it is allowable for him to call *li* the ruler of heaven and earth. Here it is clear that he tried to avoid any anthropomorphic vision of the Mind of the universe. He said, "the so-called Mind inherently has the meaning of rulership, but what we call ruler is but the *li*(principle), not that there is a principle outside of the Mind or a Mind outside of the principle."[48] And again, " The so-called *di* (God on high) is the principle taking the role as ruler."[49] For Zhu Xi, the non-substantial *li* or principle was the ruler of the universe. *Li* was a sort of non-substantial Ultimate Reality. But he was against any vision that looked on *li* as a kind of intelligent person that could think and judge the good and evil in the world. In his words, "The blue sky on high moves circularly without end…we can not say there is someone who is judging evil deeds up there; although we cannot say there is no ruler up there, either."

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[46]Ibid., p.46

[47]Ibid., p.4

[48]Ibid.,

[49]Ibid., p.5

[50] Zhu Xi means to say that in the universe, there is some non-substantial, non-personal ruler, which is the *li*, but not a personal God.

According to Zhu Xi, *li* was the Great Ultimate, therefore it represented for him the Ultimate Reality. But, in my view, recognizing the li as Ultimate Reality does not mean unambiguously that the Ultimate Other exists. Here we make the distinction between "Ultimate Reality" and "Ultimate Other". In all religions and philosophies there is always some sort of Ultimate Reality, like the Heaven in Confucianism, the *Dao* in Daoism, the emptiness or the One Mind in Buddhism, God in Christianity…etc. But what we mean by "Ultimate Other" is more like a Mysteriously Mysterious Mystery, Deus Absconditus or Hidden God, or the unspoken Dao, which cannot be seen only as a personal God or as any Divinity of human construction. The Ultimate Other, even when revealing itself, keeps always some alterity, some unrevealedness, some unfathomability. For Zhu Xi, *li* was the Ultimate Reality, but not the Ultimate Other.

Nevertheless, we should say that in his younger days Zhu Xi does seem to have been attracted by the Ultimate Other. According to the *History of Song Dynasty*, for example, when Zhu Xi learned to talk as a child, his father pointed to the sky and told Zhu Xi "That is Heaven", to which Zhu Xi responded, "What is there beyond Heaven?" And later in life, when he gave commentary to Zhou Dunyi's *Explanation to the Diagram of Taiji* (the Great Ultimate), he read right from the beginning "the Infinite Ultimate therefore the Great Ultimate". These instances showed that Zhu Xi was in fact open to the Ultimate Other. But his final philosophical system was achieved through the building up of his theory of *li* and *qi*, and there he interpreted the Great Ultimate as *li*. As Julia Ching has pointed out, "The concept of the Great Ultimate (*taiji*) marks the climax of Zhu's philosophical system. ..the concept became famous especially with his own contributions, which transformed its meaning by relating it to *li* and *qi*."[51] Although Zhu Xi 's concept of the Great Ultimate was not totally deprived of an openness to the Ultimate Other, his philosophical system was more like a system of immanence than transcendence, in which li served as the Ultimate Reality and there was no place for the Ultimate Other.

We should notice here that, philosophically speaking, the term "Great Ultimate"

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[50]Ibid.,

[51] Ching, Julia, *The Religious Thought of Chu Hsi*, Oxford: Oxford University Press, 2000, p.33

as used by Zhu Xi was not totally without any ambiguity. Sometimes, what Zhu Xi meant by the "Great Ultimate" denoted the Ultimate Reality. In this case, those particular principles of all other concrete beings such as natural beings and human beings would be seen merely as participative manifestations of the Great Ultimate. The relation between particular principles of particular beings and the Great Ultimate was, as Zhu Xi put it metaphorically, like the moon itself and all moons reflected on ten thousand rivers. This kind of part-whole relation was expressed in the saying that "Principle is one yet manifestations are many." As to particular manifestations, each human being and each natural being had their own principle which became thereby the nature of that particular being. As to the totality, the whole universe had a common principle which Zhu Xi saw as as the Ultimate Reality. On this level, he looked on the principle as the Great Ultimate, taking therefore *li* or principle the Ultimate Reality. Normally Zhu Xi did not call particular principles the Great Ultimate, but, since they were all principles, no matter whether particular ones or the common one, he would sometimes confuse the common principle with particular principles as when he said, "each person is a Great Ultimate, each thing is an Ultimate Great."

In summary, we can say that, although Zhu Xi did not exclude some openness to the Ultimate Other, what he himself achieved was a philosophical system of immanence built upon *li* and *qi*. His interpretation of the Great Ultimate as *li*, while integrating the Ultimate Reality into his system and indeed letting it become the leading core of his system, in the meanwhile lost sight of the otherness of the other or the hiddenness and the unfathomability of the Ultimate Other. I would say that, concerning the relation of human being with the Ultimate Other, we should always keep an eye on both the manifested side and the unrevealed side of the Ultimate Reality, which would thereby enable us to have a more balanced discourse on religion.

V. Conclusions: Towards the Dimension of the Other

From the above discussions, it is now clear Zhu Xi's notion of the "investigation of things to inquire into their principles" was well imbued with scientific attitude. His method of inquiry into natural phenomena consisted mainly in reading books, observations (implicitly with the intention of verification or

falsification), reasoning and practical experiences. As to the conclusions he drew from his inquiry, some could serve only to hypothesize a higher level of generality, and some were indeed natural knowledge and scientific theory of very good scientific quality. There are three points in his scientific thought that warrant our special attention:

1. Zhu Xi's criticism and correction of existing theories reveal a certain reasonableness and rationality. One point of interest is that he took whether or not a feasible model of a theory could be formed as a criterion to measure its rationality. He took *Hun Tian* theory as reasonable because it had been modeled in the armillary sphere, but this was not the case for *Gai Tian* theory. Even if *Gai Tian* theory could produce a model in the form of an umbrella, this was not reasonable due to the fact that an umbrella could not prevent the wind from leaking. From Zhu Xi's use of structural and dynamic analogies in his explanation of the hexagonal form of snowflakes, we can say that Zhu Xi's mode of observation and reasoning about natural phenomena contains its own rationality.

2. Zhu Xi's observations on natural phenomena were methodical and his reasoning was probable. His scientific attitude is shown by the fact that he verified his theories with empirical evidence, as, for example, when he used the empirical evidence of oyster shells to verify his theory about geological change. When it came to empirical evidences, Zhu Xi seemed to be very good at making empirical observations, sometimes with and sometimes without the help of instruments, such as an armillary sphere, but he never used systematic experimentation to collect empirical data. The problem was that he often took as reliable data reports about knowledge by acquaintance either narrated by morally trustworthy persons or recorded in books, and in doing so he got confused, as in the case when he said that hailstones were produced by lizards.

3. Concerning the propositions of theories, Zhu Xi relied upon his philosophy of *qi* to deduce other more derivative and particular theories. He explained both natural and human phenomena by his philosophy of *li* and *qi*. This presupposed a vision of the world ruled by the principle of similarity, the principle of relatedness and the principle of responsiveness, by which different things and their reasons were compatible and communicable one with another, and the human being could unify them into one comprehensive understanding through making unceasing effort in the investigation of things and through self-cultivation.

Not only Zhu Xi, but also traditional Chinese philosophers in general, cherish the idea that all beings in the universe, both human and otherwise, are immersed in co-naturality, interrelatedness and responsiveness and that human beings should and can reach the Ultimate Reality through their intimate experience with it based on these principles. Most Chinese philosophers tend to think that human existence is internally related to heaven and that this internal relationship is an essential constituent of the human being, comprised of the human heart, human reason or human inborn knowledge and ability, which, through a process of self-cultivation, extension and fulfillment, can be fully realized in human perfection. All of this is quite warming to the human heart and very encouraging for human existence. But the overwhelming emphasis on the co-naturality, interrelatedness and responsiveness among all things, which characterizes Zhu Xi's and most Chinese philosophers' vision of the world, should be balanced by a contrasting vision of the transcendence and the otherness of reality. Because of the above presuppositions, Zhu Xi's investigations of things tended to focus on the unity of all things rather than their difference and alterity. Yet paying attention to differences leads to recognition and respect of the otherness of other beings, which leads in turn to our showing unconditional generosity toward them. This problem is not limited to Zhu Xi's philosophy. There seems to be a line of development in the history of Chinese philosophy which has led to immanentism to the neglect of the other.

Today, how to promote respect for difference, generosity towards the other and the liberality of letting the other be other, are essential questions for the future development of Chinese culture. In other words, how to open the dimension of the other, or better, that of many others, and generosity towards many others, is the most important task facing Chinese culture in its march towards the future.

Let me say a few words of conclusion to our discussion of Zhu Xi. The case of Zhu Xi clearly demonstrates the truism Aristotle also sustains, that human reason is by nature curious to know all things. Our desire for natural knowledge is surely an inner dynamism that pushes us to go out side of ourselves and to go towards many others. Humankind's commitment to natural science is surely an enterprise of strangification by which we go beyond ourselves to the physical many others. Natural science, when done with self-awareness, may be helpful in some sense for human being to achieve self-understanding, even to the point of achieving a unifying understanding of things and self via the co-naturality, relatedness and responsiveness

of the universe. Nevertheless, this rational attitude of natural science can at its best construct a rational system of immanence, and will lose its dynamism of continuing its openness to the Ultimate Other, if we human do not continue unceasingly to open ourselves to many others. Without openness to the Ultimate Other, human religious feeling might become a hopeless cry borne of a feeling of internally drifting, bound within immanence without any outlet. We should say that the unconditional generosity constitutes the foundation of ethics, whereas the longing for the Ultimate Other constitutes the essence of religious spirit. On these two levels, Chinese philosophy should reopen its mind and make new progress after having achieved so much in its long history.

Vincent SHEN
Lee Chair in Chinese Thought and Culture,
University of Toronto
vincent.shen@utoronto.ca

At the Border Region of Philosophy and Cognitive Science

FROM THE ANTHROPIC TO THE ANTHROPOID PRINCIPLE

Milan TASIĆ (Niš/Serbia)

On the anthropic principle

The so-called "anthropic principle" [Carter, 1974], formulated in terms of Big Bang, of the gravitational constant etc., is more or less a necessary condition for the formation of organic matter, what was completed during the evolution of the universe by emergence of life on Earth, of rational being, of human. For if the inanimate nature has already ruled by the established laws of the universe, and in its embrace has appeared once the living one, which surely did not exist so far, the question was: does its emergence have already been *lawfully* "registered" somewhere on the line of more and more complex organization of matter? More specifically, since the powerful theories about the origin of the universe have been imagined, as that of "Big bang", of "superstrings", or "M-theory" et al., or the values of various "physical quantities" in the nature have been calculated, such as : gravitational constant *g*, the speed of light in the vacuum *c*, the elementary electricity *e* etc., upon which all relatively stable laws (changes) in the macro and the micro world are relied, it has been found that (only) slight deviations from these values would prevent, say, the creation of carbon and heavy elements, and then of life on Earth. Or, when the values of some constants were interpreted, it have been noticed more coincidences, in different areas, what forwarded to the conclusion that it is possible to be about a purposeful, predetermined, and not about an accidental occurrence of life in our planet.

For example, we have first that the electromagnetic force between two electrons is 10^{39} times greater than the gravitational force between them, so that the lifetime of Sun (from the emergency of human), and the expansion rate of the universe would be quantities of the same order (with as many digits), whereas by 10^{78}, or $(10^{39})^2$ is given the number of all particles in the universe too. Then let us ask how the life of human beings and the life of a star (the Sun) depend on the amount of electromagnetic and gravitational forces and their mutual relations, as well as to what refer that almost "mystical" number 10^{39}? In fact, one finds that of the force of gravity and of the electromagnetic force depend the reaction rate (of fusion) of nuclei of hydrogen atoms in the Sun's interior and of creation helium atoms, when light and heat are released, as well as the duration of the Sun as a source of life on Earth. Thus, these two forces – of gravity and of electromagnetism – are limit points of an exclusive importance for the very emergence and maintenance of life on Earth, for if the gravity were (slightly)

higher, and the electromagnetic force slightly smaller, this star would be earlier burnt and become "red giant", and if it would be otherwise, it would move to a "red dwarf". Both times, the structure of the solar system – and not only of it – would not be such as it is, nor would the Earth itself exist as a planet. In that manner the amounts of these constants are precisely "reflected" upon the universe itself and its development, from the constitution of atoms until the stars and galaxies, to the supernova, black holes and the expansion of the universe.

For example, to our universe necessarily belong, after it, three spatial and one time dimension, because otherwise its stability would be disrupted and causality destroyed. At the same time, just the "range" of 10^{39} units of time in the life of a typical star will suffice to create, in the course of evolutionary process, the heavy elements, such as carbon, which are in the basis of life on our planet. Namely, if at the beginning of the Big Bang, in the era of so-called "quantum gravity", bounded by Planck's constant ($10^{-34}m$) and the Planck time ($10^{-44}sec$), the events in the development of the universe are still unclear, this is not the case with the periods that followed after. Thus, in one of them, for half an hour and three minutes after the Big Bang, during the so-called "nucleosynthesis", from already formed protons and neutrons, will come to the constitution of stable nuclei of light elements, first, hydrogen and then helium. The formation of atoms occurs when as the result of cooling of the universe, the electrons conjoin to the core, etc., so that the galaxies started to arise a billion years later, and which will then generate the stars. Finally, in the process of nucleosynthesis in the cores of stars, the heavy elements: *C*, *O*, *N* etc. are created, which will be scattered through the universe after the explosion of stars, now as supernova, and what will lead to the creation of new generations of stars.

In the balance, all these circumstances, as well as many others, at the macro and micro level, have been reflected "biologically" upon the emergence of life on Earth, which has led the astronomer Brandon Carter to expose the thesis in the form of a principle – the s. c. "anthropic principle" – and which he has formulated in its *weak* and *strong* form. In the first case, he will say: "We must be prepared to take into account the fact that our location in the universe is necessarily privileged to the extent of being comparable with our existence as observers". [Carter, 1974]. And in the other one: "The universe (and hence the fundamental parameters on which it depends) must be such as to admit the creation of observers within it at some stage". [*ibid*]. Both times the principle not only allows a particular "prudence" in the origin of life, but also of mind matter and of human being, as the observer of the same universe. After that the anthropic principle is rather a speculative than a scientific assertion, because

different coincidences are here only observed, and not proven, nor derived from one another, which otherwise is the aim of a scientific knowledge.

Let us say also that for the time being it lacks an unique theory – the only one equation – which would describe the (common) origin of all four known forces in the universe (gravitational force, electromagnetic force, strong and weak nuclear forces), in order to trace more accurate and convincing description of all phenomena, on a large scale from micro particles to the stars and galaxies. Otherwise, the chances to achieve it offers the so-called "string theory", where the subatomic particles (electrons, quarks) aren't seen as points without dimensions, but as one-dimensional oscillating lines or strings. It has largely succeeded to "reconcile" the quantum field theory and the general relativity, as it is too in accordance with the general postulates of quantum theory of gravity et al.

The arguments of the cognitive theory

The anthropic principle, therefore, cannot be proven. It is accepted or rejected on the basis of reasons having the character of prophecy, of belief, of intuition. In fact, even if we would possess an irrefutable proof that the world *can* fully be known, it would not be the proof that it *must* be known. (And this is precisely the requirement contained in the anthropic principle). Otherwise, the result of Hume's epistemological insight is that neither the necessity of succession of consequences from causes is given in nature, but that it belongs to the human sphere, so it is all the more groundless to take the claim for the possibility of knowledge of the fact that the very need for knowledge of the world is entered into it as necessary one. Because neither natural-scientific, nor even mathematical theories do derive their conclusions with an absolute necessity of validity, doing it rather approximately, so we have that after the plane geometry of Euclid, has come "more precisely" geometries on curved surfaces of Riemann and Lobachevsky and after Newtonian physics – Einstein's theory of relativity and quantum physics, as more reliable ones and so on. A rich and certainly reliable reference system for this kind of frame of thinking is offered by the theory of knowledge in philosophy, since the anthropic principle itself is epistemological in character, at least when it postulates the existence of the world to be learnt. For if the definition of knowledge is in the fact that "what is outside of us to become a part of ourselves", and if this is possible indeed, then the anthropic principle is justified by the epistemological principle itself, as at least a *necessary* if not a sufficient condition for it.

Different principles in philosophy from the antiquity to the present day, favor the validity of the anthropic principle. Such are, for example, the earliest slogans as: "The world is one " (Thales), or else: "One and all" (Heraclitus, Xenophones), because if, for example, the thoughtless world (cosmos, nature) would exist somehow in itself, as autonomous and independent of the world of thoughts (of knowledge), it would be two separate worlds, not a single one. Or else, when Heraclitus compares the soul of man with coals which is incandescent "when brought closer to the fire, and extinguished when removed from it" [Bett, 2005], for it acquires too the power to perceive and to think, when the divine mind goes down into it, that pervades everything. So one and the same power, Logos is in the basis of the created world and the world of knowledge, both times as necessary one, or in other words – if would be no world, it would be no knowledge itself, and *vice versa*. Empedocles too, as it is known, used as principle: "the similar is grasped by the similar", and which equally tells about a principal identity of the material world (nature) and the human spirit (cognitive consciousness). Then, better than he, Plato will express on it when he designates the knowledge (the creations of mind and intellect) as a mirror of the reflective world (of ideas), in the ontological sphere, and where to each thing (being) from the sensible world, it corresponds some opinion (belief or foreboding) in the epistemological sphere.

In the contemporary philosophy, the identity of thinking and being is expressed by the famous slogan: *Cogito ergo sum* of Rene Descartes, just as Leibniz's "preestablished harmony", implied by divinity, postulates a harmonized relationship between, otherwise, from each other isolated monads, which "do not have windows through which something could enter or go out". Their main activity is precisely to reflect the world around them, doing it with different degrees of clarity, while the cognition is, no doubt, a kind of reflection of the outside world in our soul-monad, where the highest level of clarity will belong to the monad of all monads, God, since he more clearly than anything reflects all that exists. Benedict Spinoza as well, within its monistic teaching, teaches about a particular "psychophysical parallelism", when "the order and connection of ideas is the same as the order and connection of things". With the necessity of knowledge of the world we acquire Kant would deal, finding that it is not in things, but in the human's power of reason for synthesis of conceptual and sensual forms, as based on the so-called "transcendental apperception" – as on a "I think", or a "general awareness". The synthesis itself is done through categories, as (twelve) synthetic forms of understanding, as well as by way of the so-called "pure forms of sensibility" of space and time, and so on. So if we have with Kant that it is

shaken with him the image on the possibility of an objective cognition of world of phenomena (as necessary and general one), he will wholly deny the knowbility of the noumenal world too, or of "things in themselves", though if in the "transcendental aesthetics", in a particular power of judgment known as the "purposefulness", he has found (in fact transcendental) solution it has to serve as a bridge between phenomena and things in themselves, between freedom and necessity. Namely, according to Gilbert and Kuhn: "The purposefulness is that subtle and floating connection which indicates that the nature is in the line with us, that the human mind and nature ... are made for each other". [Gilbert, Kuhn, 1954].

The view of the universe of Schelling is after close to what is expressed by the anthropic principle. Namely, he will say that the "nature is visible spirit, and the spirit is invisible nature" [*ibid*], since both nature and spirit express one and the same Absolute. According to him, the nature is a self-creating power that goes from an inert and lifeless matter, at the beginning, toward a live, animated and thoughtful thing, in the end, while showing a clear objective and accurate purpose: to create the life, the feel, the organism. The degrees of its manifestation on that path would be: the inorganic substance, the force (physical, chemical, or magnetic), the electricity, the organic matter, and finally the body. So the meaning of his thesis: "The nature begins unconsciously and ends consciously", he points out in the phase of the philosophy of nature, that it is a "becoming I", what is, as we have said, close to what is brought by the anthropic principle.

Finally, the Hegelian system of objective idealism, as a panlogistic teaching, which highlighted the slogan: "What is reasonable is real and which is real is reasonable", tells properly about the principal possibility of knowledge of the world "to the end". Because he spoke at the beginning of his lectures to students: "The natural essence of the universe has no power in itself could withstand the courage of knowledge" – what is still an affirmative teaching about the cognition of world.

We have so that, as we said, the ratio between cosmic and other constants has favorably reflected on the emergence of life on Earth, since, for example, if carbon core were slightly different, its synthesis would be impossible, and it would not come to the emergence of life on Earth, as well as the neutron whose lifespan were shorter, could not be conjoined to hydrogen to create helium, etc. After all, we are built ourselves of the matter of this world, and the questions about it are necessarily as they are, while in a different world it would be illusory to think they are necessary and possible as such. So far, they are primarily met through the results of natural sciences (biology, chemistry, physics) over the centuries to the present day, and the powerful

tools along that way would primarily be experiments, confirmings in the experience, but also developed mathematical-logical methods. And now we have that man has gone behind the structure of matter to such an extent to be able to create so far non-existent materials in nature (such as plastics, etc.), as he has penetrated deeply into the mystery of life itself (genetic engineering, etc.).

The anthropoid principle

Now let us ask an important question: If the vector of evolution of cosmic matter in the nature (as its complexing, etc.) is directed towards man, to the development of awareness, of knowledge, of memory, and other characteristics of a human being, to what extent the same vector would be recognized in other creations in the nature as well as in what the man creates himself?

A sufficient verification of this assertion would go in favor of the thesis that may be the only thing to which the nature is striving – at least on our planet – is just to create beings with anthropoid features. It would be elements for the formulation of a (possible) "anthropoid principle" in cosmology, as well as in the philosophy, which in turn would give right to the validity of the anthropic principle in question. It would be, therefore, read:

''In what is coming to be, the nature (including man himself) tries to create entities with anthropoid characteristics'' (*The anthropoid principle*).

In this regard, further, let us consider somewhat the characteristics of animals and plants, in the light of this principle, on the one hand, and what creates man himself afterwards, in the case of machines and cities. Starting from what can be said about a human as certain – although we encounter more than thirty definitions of this notion (and more than three hundred definitions of life) – namely, to be a sensual being, a being who tends to a life in the community, able to learn and to adapt to different conditions, who has regards to the environment, i.e., who follows some norms of conduct, or even aesthetic patterns etc.

First, regarding the structure, each of the considered entities can be described in terms of the whole and the parts making it, where each of parts is a whole in itself, although governed by demands of a (higher) wholeness to which it belongs. Because man, animal, and plant consist of organs (as parts), while the organs are made of cells, and cells of core, membranes, etc., as we recognize equally parts and parts of parts, in the case of machines, of cities etc. – and not only of them. For example: the language consists of phrases, the phrases of words and words of letters, or: we see mountains on

Earth's surface, seas, rivers, etc. Then the parts: hands in humans or limbs in animals, or branches in plants have certain properties that belong only to them, just as the city wholes, say, municipalities and local communities are autonomous in exercising their functions. But each of them is at the same time subordinated to the requirements of a "whole": of (that) man, of (that) animal, of (that) plant, of (that) machine, of (that) city.

The anhtropoidity in the inorganic nature

Can we then recognize the baselines of life, as we know it today, and to what extent, on a wide scale of evolution of matter towards what is "living", and what has begun about four billion and lasted for millions of years? It is certainly about a too large "gray" or "transitional" stage of life, which begins with an inert matter and gradually passes through certain "animated" zone, to the phase of "almost alive" and, finally, the very alive. Bearing in mind, first, that we have as primary tags of living, no doubt, self-protection, motion (displacement), nutrition (metabolism), reproduction, communication, evolution, etc. Let us take in this occasion the definition of NASA of the concept of life: "Life is a self regulatory chemical system which obeys Darwinian evolution", so that the legality of evolution should also be searched and identified in the aforementioned "gray" zone of life. And to do it in each of the following fields: chemical, biological, physical ... – and what in the last century succeeded to a different extent to researchers as well.

So, more than a century, a doctor of Nantes, Stéphane Leduc [Leduc et al., 1912], tried to identify traces of life in a particular flora of chemical compounds he received by a mixture of salts of metals (of copper, cobalt, iron), which would form a "vegetation" in the form of shrubs, bubble, amebas. And when, in 2013, Jeremie Palacci et al. [Palacci et al., 2013] immersed hematite particles in a solution of oxygen in water, in the presence of the blue light of spectrum, they received crystals able to move on their own and to divide themselves, to "food" from the energy of solution, or else to "repair" their damaged places to their complete form. What otherwise would not come to be in the absence of light, and what looks exactly like the metabolism in living beings. So here in the case of physical-chemical processes one could speak in biological terms, terms of living creatures, and so is featured the thesis that in an evolutionary sense the electricity, concentration, osmosis, ... precede the exchange of matter and energy in living organisms.

Finally, in the biology, at Harvard University, in the Institute Santa Fe, were carried out experiments in search of a certain minimum system of life, as proto-cells, or

molecules able to create a membrane around themselves and to communicate information. It would be a way to preserve themselves, and then multiply, as a way to mutate and realize life later. It is interesting that even in computer programs among themselves, one has succeeded to speak entirely in terms of inert systems, even if it is not possible to do it in terms of living, or almost living beings. Such a case is with the program *Tierra* [Ray, 1991], which allows presentation in a manner of horizontal lines of different colors, having the role of "digital beings". Formations capable of being replicated and arbitrarily mutated – so imitating the laws of evolution – as we meet here "parasites" surviving at the expense of other beings, but also attempting to protect themselves from them, and even to parasitize on them. Or, as isolated, they will seek to cooperate and complement with other beings, and what is a kind of relations from the biological sphere, etc.

The anthopoidity in the vegetative world

In the world of plants, whivh make up 90% of the total biomass on Earth, we encounter phenomena which resemble the characteristics of animals and humans, and can be thus described in these terms. Thus one speaks about hearing and touch in the plants, about their power of movement and communication, of recognition of relatives, i.e. of memory. Or, again, they have a "sense" of balance, they can defend themselves or call for help, as they express properties resembling familiarity, solidarity. But, in relation to animals and to humans, they are frustrated especially by being fixed, and they can be inasmuch harder protected, what only does more complex some phenomena in them, so that they have, say, more genes than humans (rice two times more than human). Or else, they react momentarily to infrared and ultraviolet rays, which we do not perceive, as well as to the slightest disturbance of environment (mechanical, thermal, chemical, ...), what is not the case with the human. For a multitude of different receptors in them are able to receive "disturbances" (signals) from the environment, and adequately to respond to them, even if they are unobservable for us, but are measurable at the level of genes, molecules. There are different methods of biotechnology which serve to it: chromatography, spectrography ... and one of results here also is that the space between cells of a tree (as a result of internal pressure) decreases or increases, making tree collected or lengthened, what should be a particular "motion" of plant to the most suitable position for it. [Ricardo et al., 2015]. Thus the membrane of the cell has here the role of a muscle, and the internal pressure – of mover …

Plants, of course, fed by generating from the light, through photosynthesis, the energy they need. And as to their different "sensitivities", which are compared to touch, smell and sound, here are examples from experiments to support it, in each of the three cases.

The stem of a cucumber (*Sycuos angulatus*), for example, due to lack of the enzyme, fails to rebuild the wooden mass, but after about thirty centimeters tall, it incurves to the ground, resulting in poor light. But the tentacles of these plants have developed sensitivity to touch, so that it can bend or stretch in order to find another plant and to "snuggle" to it [Chamovitz, 2012], providing an upright growth. As for the "sensitivity", which is compared to the smell, we recognize it in the case of greater dodder (*Cuscuta pentagona*), because, as a parasite, it does not have chlorophyll and cannot perform photosynthesis, but in order to feed, it writhes randomly in space around in the absence of prey. However, when it is equidistant from wheat and tomatoes, it always chooses the tomato, because it is juicier and attractive by its fragrance [De Moraes et al., 2008]. Finally, when it is about the reaction of plants to sound, we give an example from an experiment of Morica Cagliani with corn planted in a nutrient solution, and the sounds of music that was coming to it. Namely, when the frequency of the sound was about 200 *Hz*, the plant roots would be extremely twisted in the direction whence it was coming on. An hypothesis has been emphasized that "the trees speak" (Jack Schultz), what has gained trust and that now is investigating, etc. – but, otherwise, the beneficial effects of classical music on the yield of the vine, or the production of milk, etc., is something which is already applied by farmers and ranchers around the world.

After, in the plant world, we encounter the kinds seeking to protect themselves but also those that "invoke" the help in the same sense. So, for example, wild tobacco secrete even 950 toxic substances (one of which is nicotine) in order to protect itself from enemies, but it can defend itself "indirectly" too, so that when caterpillar, its enemy, bites the leaf, it secrete the so-called "trichomes", releasing a strong smell which now induce bugs and ants to attack the caterpillar.

And when it is a question of forms of communication of plants, they are really the most diverse: among them and outside them, among insects and birds, through signs of chemical or physical nature, through the air or underground. In our anthropological terms, we find the words for some of them: recognition of relatives and care about them, solidarity. Thus, Susan Dudley [Dudley et al., 2013] has planted two groups of plants, the one of which was from the same, and the other from a different species. When forty days after she has measured their roots, she has found that less grown

were those from the same group, and more the others, what was interpreted so that the first ones "expressed" a less concern for food, "showing solidarity" with their plants-sisters, than the others. Song Yuan [Song et al., 2010] describes one aspect of underground communication between the roots of tomato and its neighbors. When attacked by the root fungi, mycorrhiza, the tomato secretes enzymes serving to all other plants as a sign of danger. Otherwise, different plants show different degrees of "regard" toward neighbors, and we find how clover, wild strawberries make it considerably, while ivy does not care in the least for the neighbors of any kind. Generally, the sprouts underground care to know in whose vicinity evolve.

Plants, therefore, have no neurons, synapses, senses, but the scientists have nevertheless stressed the thesis that the listed phenomena are owed to something, at least from afar, resembles the senses, and even some kind of brain in them. In the latter case, the role of this organ is entrusted to tops of roots, and even Charles Darwin wrote about it: "It is hardly an exaggeration to say that the tip of the root, which has the power to govern neighboring areas, acts as the brain of the lower animals ...". Namely, sensitive to heat, to humidity, to electrical and chemical signals coming from branches and trunk, the roots coordinate those data and their activities. They differ up and down and warn leaves to less evaporate in times of drought, etc.

The anthropoidity in animals

As it is known, the human being shares the same features with many kinds of animals, whether they are present in traces in them, or clearly expressed, although in the evolutionary terms he has risen high above the animals. Primarily that the brain of man has a hundred billion nerve cells (neurons), able to transfer informations among them and to process them, what ultimately led to the emergence of consciousness and self-consciousness in him, and which only he has on the planet.

The animals, of course, as human beings feed, reproduce, adapt to environmental conditions, etc., but they do it with an extreme diversity than people, what is owed, above all, to a different power of learning and memory characterizing these two species. The man knows different forms of learning: from those simple by habit, conditioned reflex, repetition ... until complex and the most complex ones, such as logical rules, proofs, conclusions. However, different kinds of animals "follow" the same forms, whether they are "rudimentary", or expressed explicitly – and certainly all gained during evolution. For example, all vertebrate species try to adapt to environmental conditions, to their environment, but it make also some mollusks

(octopi) [here and after: Chapouthier, 2009 *bis*]. And when it is about conditioning, it is known by earthworms, or bees. After, as an example of animals which can learn by repetition it could serve parrots for they are able to learn up to fifty different "sayings". As some birds too can distinguish numbers to seven, or eight, etc. But learning is particularly associated with intelligence, as a characteristic of animals with a developed nervous system, what helps them to adapt to the environment, and what we meet especially in chimpanzees, but also in dolphins, birds, mice. Chimpanzees, for example, can order objects by form, color, size, and dolphins to execute commands after signs which gives them a man. Or, again, ravens, jays ... will hide food, if they notice a predator nearby, while the Galapagos finches use long spines in order to pull out the insects they feed on. etc.

With the aforementioned forms of learning as memory, there are in animals the other more special forms, on the same line of a more successful adaptation of the individual to the environment. Thus, the hatchlings of many species will tie (only) to the animals "slightly different" of their mothers, and which they would get to know by examination of forms of their bodies. For example, the younglings in nidifugous will not go for a fox, even though they make it with each object that moves. Especially animal species that have evolved to a higher level (mammals, birds, ...), in the same sense of execution of their vital functions, follow various games and rituals: from teaching younglings to hunt et al., to games in order to compete, or to rituals to attract partners etc.

Then, when the matter is of consciousness, of self-consciousness in man, it has been long believed this phenomenon to be associated with language, with thinking, having no place in animals just because of that. However, when it entered into the very essence of the notion, it has been shown that a lower form of consciousness, the so-called "access consciousness", refers both to people and to animals, and that another, higher form of it, or "phenomenal consciousness", characterizes only men. In the first case it is about the fact that the animal (human) "takes into account" the objects from its environment, those which are favorable to it and others which are not, or places where it can stay and those where it should not go down, etc. And in the second one, about the so-called "subject consciousness" or "self–consciousness", whose center is the most developed part of the brain, the neocortex. However, neurologists have found that the brain as a whole is able to make decisions without "appeal" to consciousness, just as a result of adaptation of the individual to the environmental conditions, over a long period of evolution.

Finally, let us ask equally, is there any kind of speaking about culture, about morality in animals, specifically, about some "proto–culture" and "proto–moral" in them? Both times one finds this is certainly the case, so that between animality and humanity there is a continuity in evolutionary sense, although the patterns of culture and morality are encountered only in trace amounts in the animal world. Particularly the marks, as rudiments of language, are spread across all bio-species, in order to "inform" other individuals of the species, say, about the possession of territory, about a danger, about desire to mate, and the like. Birds do it via twitter and songs, while the bees by buzzing and movements of wings can "transfer" to other bees the direction from which they come, from which distance, and even what amount of powder they are carrying. Or, again, some chimpanzees use twigs to "pick up" termites, with which they feed, while in a Japanese island monkeys first clean the potatoes from the sand before they eat them. Etc.

And when it is about a "proto–moral", one can subsum here the care for younglings in vertebrates, or what make chimps living in a herd: when they help, fight and reconcile or negotiate, or forgive and punish, or assist handicapped individuals. Animals, therefore, like people, have one and the same (natural) basis of morality, even if there is a discursive moral, carried out on the basis of intellect and thinking only in humans.

The anthropoid features in machines

When speaking of machines we have in mind people's products as particular (mechanical) "extensions" of man's hand, in order to practice activities carried out by himself. Trying to "transfer" into them – to a greater or lesser degree – his own characteristics and powers, even if they do not necessarily follow the anatomy of the human body, and that they are not made of some artificial "tissues", or "neurons" and the like. After the case of an aircraft which flies without flapping its wings like a bird, or a computer that differs from the human brain, though it performs many operations as that organ. May therefore machines and to what extent to have the same properties and to perform the same operations, which the evolution has given to man, and which, in an affirmative case, would mean that man has the same "mission" which the nature (we saw!) follows in the case of inorganic matter, i.e. of vegetative and animal world? And what would subsequently led us to inquire if it is not the case with all other creations of his mind, like the institutions, villages, community groups and the like.

Otherwise, of a close and immediate relationship of man and machine, have spoken in particular the French philosophers-materialists, like Descartes, Malebranche,

Lamettrie et al., for Descartes, for example, says: "The body is a machine that moves by itself". Then Lamettrie on a mechanistic way "derive" the soul from the body, while Laplace on the same (mechanistic) basis argues that it is possible to predict the state of all universe at any point of time, based on the initial data. Etc. Many strong arguments in favor of mechanistic views on the overall developments in the world, are provided by IT software and hardware today, because, as it is known, by the way of a program it can be reconstructed the movement, the sound, the color. And not only that. And inasmuch as in this way, in the last century, the so-called "Turing test" has largely shed light on the "human" concept of intelligence, showing that machines can "rule" by it too, only if they succeed to meet the requirements of the test and "pass as a human". In fact, it seems to be essential in this phenomenon that "software" and "technical one", by which manage to master man and machine, and not any other structure of these entities. What greatly has encouraged the development of artificial intelligence in our time and so on.

Can therefore machines to adapt, to be intelligent, to learn, to remember and be curious, doing so in the same sense as human beings? There is no doubt they can do all to varying degrees, primarily on the basis of data from their memory and instructions entered into them. Because it would be known, in constructing, what is harmful and what is favorable for them and would assess the possible consequences of unforeseen actions. And inasmuch as machines can remember too, because "every object is a basis for memory" [hereafter: Chapouthier, Kaplan, 2011], hiding in itself the intentions of its author and the history of use, until to customs of time ... They can learn as well, by following for example methods of artificial intelligence, and to perform then predictions, because they are capable to process an unimaginable amount of data from its own history memory. We note in this regard all (successful) predictions today in meteorology, in economy, in stock exchanges. So that with automation and self-regulation all this would lead to a higher degree of autonomy of machines, over generations of their technical development.

Turing considered that the robot who thinks can be constructed only on the basis of description, of questions and answers, or problems and their solutions already confirmed in the experience, as was the case with the computer *Deep Blue*, who has defeated in 1997 Garry Kasparov, world chess champion. And other authors would consider to be necessary to follow in this regard syntactic structures of Noam Chomsky, or phases in the development of speech and thinking of child and the like. It would support the definition of the notion "intelligence", and what this author had in mind to achieve by its "test". In fact, such a machine will be intelligent if only on the

basis of descriptions it can correctly answer a number of issues and so to "pass as a man" (s. c. "Turing test", 1950). But, there is no doubt that both man and robot are "on the same side" of drawing conclusions, of the power of proof and so on, while the priority of human thinking is in its syntactic power, and of a computer in the amount of memorized informations and of speed of performing operations.

Of course, the machine can be determined in terms of human qualities of curiosity too, insofar as they could be so designed to can defer only to conditions favorable for them, and to avoid those that are not. As to be able to assess the consequences of each adverse effect, and the like, and all of it on the basis of programs set in their ground. Or, as human finds ways to preserve his health, so will be the machine able to protect itself from damage, or from wear of parts. For, say, an overheated motor will stop to work, and a burdened lift be blocked, etc. But machines do not feel anything, because both in humans and animals the feelings are associated with sensory-motor reactions of the body, which lacks in them. But they can adequately act in the case of both internal stimuli, and external ones, say, to repair failure in themselves, or to return to the initial state (irreversibility) and more.

Let us forward several other human characteristics too regarding the same possibilities to be recognizable in machines as well. We have here in mind the essential features of him: self-consciousness, culture, morality.

Namely, a machine can certainly "notice" a breakdown in its work, but also to secure itself from external injuries. It resembles the (elementary) "consciousness" it has about what is in it and what is outside, but when it is about the nature of its environment, there may be such methods of recognition: for example, whether it is a living being, or an inanimate nature, etc., until the ways to be recognized the "intents" of something with which it comes in contact. Likewise, experts in artificial intelligence and others try to "supply" machines by a special "internal" speech, as well as by an "outside" one in relation to the external world – what is, otherwise, an old dream of mankind: the machine which speaks.

However, whether machines can refer to each other and to learn from each other, thus achieving a phenomenon which would be quite unique and could be labeled as "cultural" one? In this regard, let us refer to the results of an experiment, described in the work *L'homme, l'animal et la machine* [Chapouthier, Kaplan, 2011]. Namely, at the turn of this century, two teams of researchers, from Paris and Brussels, carried out an experiment named "Talking heads", with the aim to determine whether machines can collectively create some rudimentary (common) dictionary? The result was such that after several months have occurred twenty words by which with sufficient

success a "tenth robotic bodies" (simulating till 3 000 computers) could denote the observed objects. In doing so, as the number of computers increased, some things were elected rather than the other, just simpler ones, being more easily transmittable and more successfully in labeling. What indicates that machines, otherwise capable to learn, can realize the phenomenon in question – although here it is only about the embryo of a possible language – because the words they have created are reused, they could change themselves, but also to evolve during the generations of their own evolution. And what would be at the beginning of possible (higher) forms of culture among these entities.

Finally, in the world of machines, whether it can be spoken about morality and on which of its forms? According to Isaac Asimov [Chapouthier, Kaplan, 2011], the author of science fiction: 1^0 a robot may not injure a human; 2^0 it must follow rules laid down by a man to it and 3^0 it must preserve its own existence (if 2^0 and 3^0 do not threaten people). It helps this author to rebuild the novel story about the (future) world in which machines would have their role, as people have their own. It is certainly possible to supply machines by "features"–programs which would allow them to identify other machines, or do not harm them, or to return to an initial state (irreversibility), if they run into obstacles. And besides, one shows in the game theory that certain strategies among the "mechanical beings" can stabilize and so on – what would *in ultima linea* make possible that some – of course limited one – system of rules to master in the future these entities.

Let us also mention a high degree of symbiosis either with a variety of human body implants, which it uses for medical and other reasons (cardiac pump, artificial arteries, etc.), or with devices we use in knowledge (microscope et al.), or with multiplied technical means of our everyday life (home appliances, cars, etc.). These are all parts of an eco-system, governed by rules which can be marked as moral ones.

Many and various are the other aspects from which it can be spoken about the world of machines, of robots, as something that has been made entirely by man himself, and which "follows" his anthropoid properties to varying degrees and in various respects.

The anthropoidity in cities

As in the case of entities we have already considered (inorganic substances, plants, animals, ...), in the cities one can recognize also a global structure, consisting of parts, and then of parts of parts etc., all of which, in their sum, act as the one as a whole. When the matter is of their appearance, in terms of a "mosaic" of Georges

Chapouthier [Chapouthier, 2009], we have at the beginning a simple annexation, or a juxtaposition of inhabited units, to each other, and then a progressive integration into higher-order complexes too. In cities, the parts are its quarters, districts, suburbs, ... as lesser urban areas, or megalopolises and ecosystems, as larger and largest ones. Otherwise, the people used firstly habitat, caves and huts, and home of bricks, of stones, etc. afterward, until the villas, palaces, i.e., residential buildings, towers. While its single room from the beginning, acquired various specific purposes and on that basis the number of rooms increased, although "home for life" is a whole, autonomous by itself. It's the same in the case of cities. Each part of the city is a whole in itself, which performs a dual function: one, own, and the function of the city as a whole intended to it. Aristotle in Politics says: "Three days after the fall of Babylon, an entire quarter of the city ignored the event" [cit. after Chapouthier, Kaplan, 2011, p. 90].

As plants germinate, and living organisms develop only under conditions favorable for them, so the cities emerged in the valleys, along the rivers and fertile fields, next to roads, to be able for supplying products and raw materials, as well as for exchanging with other regions. A city knows of course an administrative division into districts, municipalities, local communities, but also into many other spheres of life: economic, cultural, educational, health. Or: we have in it financial, educational, cultural and others institutions, which in turn know their own subdivisions into narrower units of the same species, according to more special functions intended to them. And just as the industry and economy are developing, the most diverse relations between institutions and people are multiplied too, and the city records its own development through history. Then, still like a living organism, cities take care of their "health". Their streets will be paved, and water used for drinking be potable enough, as they know in their embrace the alleys, green areas, parks, or simply – oases of empty space. Or, again, a human tends to a physical activity, to sport and in sports compete teams in the cities. I.e: the cultural needs of cities will satisfy its cultural institutions: theaters, operas, ... and, say, as a man, his home have their own "day" (as a holiday), the cities of the world have them as well.

Cities, like organisms, spread and develop, on account of their suburbs, or going to altitude. The human population which inhabits them is changing: it borns and dies, comes and goes away. They themselves may have their own "life expectancy", even if it is disproportionately higher than the lifespan of people with whom are compared. So there are cities permanently inhabited for thousands of years (Damascus – 10 000 years old, Athens – 4000 etc.), but there are some vanished forever throughout history

(Troy, Hefes, etc.), they were as a rule destroyed in wars and rebuilt again, they suffered floods and fires ... being renewed again. Their names remained the same (Roma, Athens), or were altered and re-restored, i.e. changed in its entirety (former Babylon, say, now is the city Jubayl, in Lebanon) [Chapouthier, Kaplan, 2011].

The man has built cities to allow him a life in a community of other people, because to be a "social being" is one of his essential attributes. Plato will say: "The man has invented city to live together, and he remained in it to be happy". The very word "polis" (*city*) in Greek, has the same root *pol* as the adverb "poly" (*more*) in the same language, while others words in other languages – e.g. "castle", "burg", … – point more to fortifications to which they resemble, being surrounded by towers and high walls. They were protected from the enemies by exterior walls – such as bark protects plant, fur animal or clothing human.

But man did not build cities only to protect or to satisfy his individual needs, but to do it with all needs he has – both material and spiritual ones – in a world sufficiently regulated and sufficiently human, in order to achieve his happiness. Moreover, the very ideals of harmony and unity (both material and spiritual) can easily be transferred to the whole human race, since, according to Aristotle, all the nature, including society, is developing in a way of living organism. The viewpoint of philosopher which in its entirety was followed by Alexander the Great, his disciple, when, during his conquests, the original Hellenic heritage, he sought to permeate by elements of other cultures (Roman, Semitic, Persian, Jewish ...), by creating so a comprehensive corpus of so-called "Hellenistic culture" in a vast area from Spain to India. A unity he realized by demolition of cities he would win, but also by raising new ones (more than seventy for a decade and half of his rule), making it with the institutions he has found (as libraries, theaters, museums, etc.), but only after he would know laws, customs, beliefs of environment and having "harmonized" them with the original patterns of Hellenic culture. The matter is of course either of a parallel persistence (*juxtaposition*) of elements from the two spheres, Oriental and Greek, or of their mutual complementarity and permeating (*integration*) – and our commander in the name of unity of entire peoples and cultures, as it is known, married his generals too to princesses of the enslaved people.

The cities have after their specifities: spatial, urban, cultural, .. as well as their own rhythm of life, which all correspond more or less to different aspects of human beings. Speaking about it Denis Laming, for example, says: "There are cities in which one walks quickly (Venice) and those where one wanders (Paris), those where one runs (New York) and those where one loses (Fes), where pedestrians are directed (Tokyo)

or expelled (Houston)" [Audouze et al., 2015, p. 78]. Cities, therefore, have their soul which reflects their unity, integrity, compactness, while the density of population, complexity and differentiation of the network of institutions and the like, follow from afar that complexity known by the evolution of living organisms. As a whole, each city is *one*, but at the same time *many* too, both simple and complex, ordered by different functional, social and other lines, but if we ask: are there such characteristics connecting they all, it is easy to find to be their aesthetic side, what equally has its analogue in the anthropological sphere.

Because the human being is, no doubt, "the being of beauty", rather inclined to what is proper, symmetrical, harmonious in nature, as he is striving all he creates to be like that. And in this sense we can speak about the cities. Their roads and squares, commercial and residential buildings ... the whole exterior they have follows certain specific forms, first of all, aesthetically acceptable for a man. And what could also be said about its interior too. The aesthetic "effect" of an interior is directly function of what he serves, so objects realize the unity of aesthetic and functional in themselves. Over time, the interior of a bureau, for example, will evolve, striving to be as effective, by a gradual reduction of elements making it, and where it finds place its social evolution in communication and business sense, etc. There is no doubt that every part of an urban area and each object is marked, in this or that measure, by some aesthetic feature, and so the whole city appears to us as a "complete sculpture" [Audouze et al., 2015, p. 200].

In a derived sense of word, the "aesthetic" could be said to be any act of creation leading to results, as an incarnation of some purpose, and the purposefulness as an aesthetic category (in the Kantian sense) can be easily recognized as an ontological category too. And like Kant who in this concept (the concept of "purposefulness") has found a general and necessary law for the liking, that is, for taste, as a subjective (innate and *a priori*) the principle showing that "the human spirit and nature are made for each other", that "intelligence creates as nature", etc., so the notion of "anthropoidity" would serve as one of the furthest ontological category, also a heuristic principle in the overall practice. Because if one likes a beauty, according to him, without any subjective interest and independently of the inclination of man, just as a result of the action of the principle of purposefulness, now we have that our anthropoid principle is laid down in the very grounds of being, in all spheres of activity, and what can help explanation of phenomena in relation to development of living organisms associated with the evolution of species. Even if – from one side to another of plants and animals – it can be extremely difficult and with variable fortune,

but such general principles are adopted, no doubt too, by other (global) development theories such as the theory of evolution, or Darwinism.

Kant reasoned in the above categories, as it is known, from the *a priori*, transcendental motives, which inclined him to differ in objects in the nature the so-called "annexed beauty", which is due to the awareness of what they are serving. It is possessed, say, by houses, villas, churches. But while our "responding" to a pleasing set of these objects is related to the aforementioned consciousness, now we have that the anthropoid principle postulates the necessary existence of such objects in an ideal sphere, which would, as realized, go to meet human needs. So the object is what "approaches" the man for it should serve to him, and then the man "chooses" it for the sake of himself. The nature is something that *in ultima linea* has a final saying in all the events, something that by its parameters has allowed to human being the best place in the universe. Then it is of an (highest) importance the cosmological question: Is man only a privileged guest among other beings, or is he and all other beings the one and only one, the unique genus – even if it is difficult to be named – registered as the farthest finality in evolutionary development?

Then, what could be said about this principle, in the case of cities, in connection with a number of other (major) labels of man as a rational being? About intelligence, curiosity, pain ... about culture, morality? Even if in the case of many entities it is not possible to speak about the soul, consciousness, laughter and the like. When it is about the first of these properties, for example, it is easy to see that it certainly holds, and it is in relation to the sum of the intellectual powers of individual people, as rational beings also. And that in the same terms it can be spoken with reason in the case of other of above mentioned properties.

Epilogue

Having it in mind, therefore a being with anthropoid properties as finality, many phases on the lengthwise of evolution of living organisms would be clearly perceived, and then all that comes, or could come in the nature (or in the social sphere) would insofar be more purposeful, if to a greater extent "outflanks" to mentioned finality. And inasmuch as the marks of a reasonable being, of a man are sufficiently clear and expressive for us, and we have somewhat evoked them in this paper, that – in the light of the anthropoid principle – we can to every segment of events in nature, to each process, or condition, lay down different requirements and establish our expectations in connection with them. Namely, it will serve its farthest purpose, if one can identify

more labels from a human sphere of life in them. Starting precisely from the fact that the man embodies the highest properties which living matter is able to realize on the line of its still further complexity, which are, as we say, clear and distinct for us.
In the following sense. If the man is already a being who chooses the most favorable habitat for himself, making in addition part of a healthy ecosystem, and without coming into conflict with it, we could be able to say the same, for example, in the case of each of the achievements of his hands: from fields planted with crops, from roads and railroads, factories and industrial plants. Of course, such would be his home, his job, his pet. Or, again: the most complex, the central part of human body, of bodies of animals, is designed by the word "brain". Then the anthropoid principle would impose that every human creations would optimally meet its purpo[i]se if it possess some central place too, from where one operates its activity. And such places it is easy to identify, for example, in the case of each of the entities: companies, agencies, schools ...

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Milan Tasić

(Ph.D. Professor, University of Niš, Serbia)

esse.homo.mtd@gmail.com

Changing Figure and Ground – Connectedness as Primary: A Re-Reading of Leibniz in the Light of a Generalised Version of Quantum Theory and Entanglement [52]

Harald WALACH (Frankfurt a.d.Oder/Germany)

Introduction: Figure and Ground – Paradigms and Shifts

I will use the psychological metaphor of "changing figure and ground" in various modes and with different associations in this contribution. It is well known that psychologists of perception, such as Edgar Rubin (1886-1951), used ambiguous images, such as the vase-face illusion (Fig. 1), to illustrate the constructive nature of our perception. We perceive the world depending on context information and on theoretical expectation, and not just "as it is". The latter is a naïve kind of realism that was put forward by neo-positivists of the Vienna Circle. It still holds sway over a large part of the scientific community, especially in the life sciences, although theorists of science have long shown that such a stance towards our world and the way we perceive it is outdated (Suppe, 1977).

Figure 1 – Edgar Rubin's Vase-Face-Illusion that can be seen as a vase or two faces looking at each other, depending on how the image is parsed

[52] I dedicate this piece to my philosophical teacher Friedrich A. Uehlein, who taught me to appreciate and understand Leibniz, in the 300th anniversary of Leibniz death.

What we perceive is directly dependent on the background theory we use. Ambiguous visual stimuli, such as the Vase-Face-Illusion can be used to trick our visual system and thereby lay open how higher neurological top down processes impact the bottom-up constructive processes (Hoffman, 2011). What is true in perception, namely that our visual perception is highly constructive and dependent on context information, is also true on a higher level of systemic, societal perception which we call “science”. Science can be understood as a communal effort of societies to understand the world we live in and to make use of it and to prevent error in that process as much as possible. Thereby, it is a kind of joint effort at perceiving the world. It is in the same sense dependent on background and context information as is our individual perceptual visual system. And in this sense, I am using the figure-ground metaphor to illustrate a very simple fact: What can be considered background (noise) in one theory might become the foreground figure for another theory. It is not a predetermined given how we see the world, but it is both dependent on our choices and on our theories. It goes without saying that some kind of moderate realism – and this is also the precondition I am working from – is a useful starting point. If science were not about the reality of the world it would be both useless and dangerous. After all, our planes fly, most of the time, very reliably, and our heating and computer systems work. But the fact that we have spent energy on studying aerodynamics, electronics and physics, i.e. invested into understanding of matter, rather than understanding mental phenomena, consciousness or other intangible processes, this decision is a constructive process, dependent on historical and cultural movements (Oeser, 1988). The catchphrase for such macro-processes has become the term “paradigm” coined by Kuhn (Kuhn, 1955). And in that sense I use the figure-ground metaphor to illustrate that if we switch perspective, or paradigm, we might see completely different things that have been “there” all along, but have not been considered or taken seriously and therefore have been relegated to form the “background”.

Thomas Kuhn took his model from a study of the history of science, especially in physics, where we know how new insights, such as the discovery of the quantum or the theory of relativity and thus the geometry of curved space went counter to how we used to look at the world for centuries. Riemannian geometry of curved space, for instance, invalidates the axioms of Euclidian geometry (Reichenbach, 1957). Kuhn used the term “paradigm” to refer to the fact that a set of presuppositions, methods, standard way of doing things, narratives and things that we take for granted is always in the background of how any science, at any time, works. “Normal science” works within the paradigm and solves the puzzles and riddles that present themselves until, within such a paradigm, enough anomalies accumulate that force theoreticians and thinkers to find new models that can accommodate both the old way of doing things and integrate the anomalies. This is a long-winded process. Often anomalies are ignored for a long time until a theoretical model comes along that helps with this integration process. Sometimes this is a disruptive process, hence the term “scientific revolution”. Old ways of doing science will not help any longer. New ways have not yet been established. Two or more fractions of scientists are struggling for dominance. Until, finally, one view prevails, becomes the dominant “mainstream” view with everybody else in pockets of small separate movements. The “paradigm” thus is a set of perceptual instructions, how to look at the world. It is also a set of methodological instructions, how to go about finding out about the world. And it contains implicit values about what to do and fund in the future, as well as gross narratives for scientists and the public alike about “what the world is likely to be and what we are probably going to find out in the near future”. The latter is then often referred to as a “scientific world-view”, which, more often than not, is more like a new scientifically minded pseudo-religion than anything else, but that as an aside.

Kuhn took his inspiration from an earlier thinker, Robin Collingwood, an Oxford philosopher (Collingwood, 1998, orig. 1940). Collingwood had coined the phrase “absolute presuppositions”. By that he meant sentences and assumptions that are necessary for any theory and scientific practice to function but that are neither part of the model itself, nor are they rationally produced. Rather they come from the common cultural, political and economic-historical background of an age. They change rather slowly, and this process itself is outside the reach of rational discourse. Thus, these absolute presuppositions have a status similar to axioms in a formal scientific theory. And similar to axioms they cannot be proven true or wrong with the methods of the model they are meant to support. This logical structure has been elaborated roughly at the same time for logical systems by Kurt Gödel (Devlin, 2002; Gödel, 1931). What

Collingwood had discovered for philosophical systems in general seems to me to be the very generic structure of the same situation: No theoretical approach, no theory, no paradigm at large can use its own methods and strategies to arrive at a sound and undisputable proof of its own foundations.

Paradigms and world models are thus ways of parsing reality from certain perspectives and for certain purposes. In the same way, shifts may occur that suddenly change the perspective. And what has been foreground and figure may become background, and what has been in the background may come to the fore and form the figure for future ways of looking. These shifts, Kuhn has made a convincing case for this, occur in unpredictable ways. This is so, because science itself is a huge non-linear social system (Oeser, 1988). Once certain boundary parameters are changing non-linear bifurcation points may be reached, as Prigogine has shown for any non-linear system (Nicolis & Prigogine, 1977). They lead to sudden switches and changes. Such sudden shifts are unpredictable and hence cannot be engineered. Often, empirical insights, as was the case with Planck's findings, are critical. Sometimes, as with the advent of quantum theory, or relativity theory, a new theoretical structure is discovered that makes counterintuitive predictions that are then shown to be true. At other times economical pressure changes ways of doing things, as might be the case in the near future for our medical system. And still at other times it is the sheer political pressure of upheavals that change paradigmatic structures, such as was the case for the dominance of the dialectical materialist stance during the communist era.

In that sense I will use the fickle nature of the figure-ground metaphor also for a potential change in outlook that I see lurking at the horizon.

The Dominant Paradigm and Some of Its Shortcomings

It needs little analysis to describe the dominant paradigm as a localist-causal-materialist paradigm. This is the current foreground. The absolute presuppositions most scientists work from contain the following:

- The ultimate nature of reality is material (materialism)
- We can understand nature by observing the material objects and by analyzing their relationships (empiricism).
- This is best done by splitting larger things into smaller components and by analyzing these (analysis).
- The important relationships between elements are those of a causal nature, where one impacts on the other (causality).
- Such causal impact is always local: It means an exchange of energy in an actual mutual process of giving and receiving at least one quantum of energy (locality).
    - This happens within the framework of special relativity, i.e. in a limited timeframe, or, in other words, in a frame of local causality. A corollary of this is that there will be parts of the universe that are locally connected and parts that are not. All those parts of the universe that can be reached by a light signal travelling at the limited speed of light are locally and thus causally connected, and others are not (see the contribution of Kigen in this volume).
- All relationships and holistic structures are secondary to those individual analytical units (outer relations).
- Reality at large can be analysed into ever smaller units and their relationships (atomism).
- What we learn about these units teaches us enough about the behaviour of the larger composites (methodological reductionism).
- These final units are of material nature; they are bits of matter. Hence everything that does not appear to be material, such as our social relationships, our private conscious mind and our collective mental products and mentality will, eventually, be explainable in terms of outer, material relationships, for instance through neuroscience (ontological reductionism).
- Very often this is also imbued with the expectation that we will be able to explain everything in a mechanistic, i.e. thoroughly causal, fashion and also

that this will reveal a thorough deterministic narrative that starts with the big bang and ends with my decision to finally sit down and write this paper (determinism).

Surely, some of these statements are more germane than others, and not everyone would subscribe to all of them. Together they form what is called the "scientific worldview". In Collingwood's terms it is a set of absolute presuppositions that dominate our current perception and actions on a collective level as a scientific community. It is often termed the "Cartesian-Newtonian mechanistic model" of the world. Descartes had proposed that the biological world can actually be understood as a huge machinery: all animals, all physiology could be seen as complex biological machines. At the time of the publication of his posthumous book "Traité de l'homme" in 1664 (Descartes, 2003, orig. 1664) this was a revolutionary idea. It joined forces with Newton's understanding of planetary movements as a mechanical system and the prospectus of analysing the whole world in terms of mechanical laws. The laws of mechanics that Newton and Descartes thought of – hydraulics, friction, forces – have been made more subtle by chemistry and approximating quantum theoretical equations in biochemistry and electromagnetism, but the general outlook is still the same. The amalgamation of the Cartesian program of the thorough mechanisation of the living and the Newtonian program of analysing the laws of mechanics into a thorough system of mutual influence and causes has led to a very powerful paradigm. It works very well for all macroscopic structures, as the flying of airplanes and rockets, the reliability of computers and technical systems testify. It is unclear to what extent it will also help us understand complex biological and social systems, or our ecosystem for that matter, as the comparatively bad track record in engineering a healthy and peaceful society since the heydays of the scientific worldview in the 19th century demonstrates.

The advent of non-linear systems theory in biology and biochemistry, the insight that non-linear systems cannot be deterministically analysed and that chaotic systems, although deterministic in their basic structures, end up in a factually undetermined space (Capra & Luisi, 2014) has shown that the Cartesian-Newtonian world model is what it is: a paradigm that is useful for some purposes, for instance for understanding coarse grained processes, and that is detrimental for others. For it prevents us from using other insights and approaches. For instance, most biological processes have been understood to be non-linear or chaotic, and linear causality is rather the exemption than the rule. Yet our medical model deals with all diseases on the background of a mechanistic paradigm (Hyland, 2011).

The advent of quantum theory in physics has shown that Newtonian mechanics is a special case. It is applicable at large scales within a classical framework (henceforth I shall use the term "classical" to refer to a view that adopts this Cartesian-Newtonian scientific world view). It is not applicable at the very small, i.e. when we reach the Nano-range of Planck-scales in time and space (the Planck constant is of the dimension of 6.6… * 10^{-34}, but through various interactions and multiplications the laws become relevant at the nano-range, whenever our dimensions reach down to 10^{-9} meter or seconds), and it is not applicable even in very large dimensions when classicality is violated because of other situations, for instance in a plasma at very high temperatures, pressure or density. Hence quasars and stellar objects can be of a quantum nature, even though they are huge. Thus, classicality holds, physically speaking, in a meso range of the not so hot, not so large, not so cold, and not so small that sustains our lived, classical world. Here Cartesian-Newtonian thinking can be usefully applied.

But what about systems that also exhibit consciousness? Can consciousness be modelled classically? Indeed, is it a classically understandable concept? Is the relationship between consciousness and the organism it pertains to a classical relationship? Indeed, is even the individual brain and cognitive system that sustain an individual consciousness a classical system? Can we describe and analyse it in sufficient detail using classical concepts?

It seems to me that here, at the interface between the material meso-world and consciousness the fragility of the classical worldview becomes apparent and necessitates a shift of viewpoints. What has been the background, the whole in which everything, even individual consciousness is embedded, becomes the figure. Let me explain.

Leibniz and Inner Relations

I will use Leibniz and his concept of inner relations and pre-established harmony to illustrate this point. Leibniz (1746-1716) whose 300th anniversary of his death we celebrate this year, was a contemporary of Isaac Newton (1642-1727) (Antognazza, 2009). He seems to have discovered the calculus roughly at the same time as Newton

did, and it was only Leibniz' corresponding all over the learned world and his bragging about with his own method of calculus that forced Newton into publishing his work and at the time accusing Leibniz of plagiarism and thus ruining Leibniz' reputation with the Royal Academies both in London and partially in Paris. The accusation was pointless, as we know today, but effective. Newton had his chair as Lucasian Professor of Mathematics in Cambridge, while Leibniz never succeeded to receive the acknowledgement that he considered his due from the scientific community. Although he was highly regarded by his peers all over Europe, had invitations to talk at the Royal Academy in Paris and met with most learned and well reputed scholars of his age in person along his travels, he never held a formal university position. He remained a private secretary and historian to the Prince and King of Hannover and was seen by his employer as the person who was tasked to write the somewhat tedious and convoluted history of the house of the Guelfs, a piece of work that cost a lot of Leibniz' time, but also allowed him to travel far and wide and maintain his scientific contacts. It is unclear whether this lack of formal reputation within the academic community of his time might have contributed to his lack of impact in his days, or whether it is the sheer complexity of his thought.

What is historically pretty clear is that he lost out to Newton. While Newton favoured a view that considered forces as exterior to bodies, Leibniz held that forces are interior to bodies and outer forces are reflections of these inner relationships (Leibniz, 1966c). The conceptual framework for this was what he called a "monad" (Leibniz, 1966a, 1966b, 1966d). This is an extremely complex and also opaque concept. It is opaque because Leibniz couches it in ever changing language depending on who he is talking to and corresponding with. For Newton – he actually corresponded with Clarke, a follower of Newton, knowing that Clarke was expressing Newton's ideas and would report back Leibniz' points to Newton directly – Leibniz coined his thought in physical language, and hence he conceived of monads as materially infinitely small elements. One might even consider this as the material analogue to his limes-calculus. And within such a monad that was, at the same time, an expression of the whole universe as a perspectival view on the Whole, forces would exist that would determine the movements of bodies. And bodies are not passive blocks of matter that sit in a container of space where they are then jerked around by more or less random forces. Rather, bodies are in meaningful relationship to each other and this complex relationship spans up what we call space. And those meaningful relationships are reflections of active, mental, movements within the monads. And here we might see monads as points of consciousness whose movement is reflected in the material world.

In a sense then, in a Leibnizian view consciousness is primary and material effects follow on from that or reflect mental activities of monads. All these monads form a huge cosmos of actively self-expressing monadic entities, whose all encompassing entity or "central monad" is God. And because God cannot but produce what is according to His nature, and because he can also not mettle with the freedom of monads, he, logically speaking, must construct a universe in which all monads are in a relationship with each other that allows for the optimum development of each single monad given the development of all others, and that allows for maximum freedom for each monad given the choices of all others, and that allows for a consistency in terms of physics and logic. Since God cannot not follow the logical and moral laws that are part and parcel of the make-up of the world, the necessary truths in Leibniz terminology, the universe must be the logically best of all worlds. It is important to note here that the "best of all worlds" is not a moral, but a logical term. In modern parlance it would be something like a complex optimization function given a set of mutually partially exclusive and maximally impacting individual functions.

How does this work out? The term Leibniz uses here is "pre-established harmony" (Leibniz, 1966d). All the monads perceive everything else – the movements, developments, decisions of other monads and the material repercussions that are reflective of them – in their inner world in harmony with what is ongoing in the outer world. The outer, material world is not the primary given. It is rather a condensation or a reflex of those inner movements. In other words: Pre-established harmony is a term that connotes the relationships that all monads have with everything else. Another way of putting this is saying that monads are cristallisation points of individual perspectives of relationships with everything else, and the material world is a reflex of this situation. Still another way of saying this is: Relationships between monads is primary in Leibniz, and individuals follow from that as perspectival points of condensation of such relationships. This is the reason why Leibniz' concept of relationship has always been termed "inner relations" in contradistinction to Newton's outlook that is one of "outer relations". In Newton, relationships between material entities are secondary and inessential to the entities themselves. In Leibniz, relationships are primary and constitutive for the entities themselves. The entities, the monads, are in fact the sum of their relationships with everything else in a perspectival framework. And all movements that we perceive are in fact reflexes of those inner relations that have been coordinated in the process of creation by God. This coordination process is ongoing and hence pre-established. It is – by logical

necessity – the optimum that can be achieved for any individual, given everything else and all decisions of all other entities or monads, and hence it is "harmony".

It can be immediately seen that such a concept is non-local: There is no physical signal that conveys the decisions of all other entitites and thus coordinates the movements. The coordination process is, as it were, formal. It has been set up in the make-up of the universe and it works itself out over time, by the way relationships and decisions manifest. Thus, all relationships are primary in Leibniz, and the coordination of these relationships is non-local, in complete contradistinction to Newton. With Newton, all entities are primary and the relationships secondary. And all those relationships are relationships that are local: local exchange of energy and force in immediate physical contiguity.[53]

This also holds true for Leibniz' view on the mind-body relationship. For Leibniz, the mental was the inner world of the monad, while the physical was its outer appearance. Thus, mind and body can be conceived as complementary, to use a modern term (Walach & Römer, 2000). That is to say, neither can be reduced to the other, both are necessary to describe reality, but they are maximally incompatible concepts, yet both are necessary to describe the reality of, say, a monad, or a human being. The principle of coordination is, again, pre-established harmony, a principle of non-local coordination between the mental and the physical, between mind and body. Leibniz

[53] That Newton himself was not so consistent is historically an interesting point. It is well known that for the effectiveness of his gravitational force he actually considered spiritual entities to convey the force. In a letter to Bentley he wrote: "It is inconceivable that inanimate brute matter should, without the mediation of something else which is not material, operate upon and affect other matter without mutual contact... that one body may act upon another at a distance and through a vacuum without the mediation of anything else by and through which their action or force may be conveyed from one to another is to me so great an absurdity that we believe no man who has in philosophical matters any competent faculty of thinking can ever fall into it." Turnbull, H. W. (Ed.). (1961). *The Correspondence of Isaac Newton - Vol 3*. Cambridge: Cambridge UP. p. 253. Thus, Newton saw the problem and tried to hold fast to a spiritual mediation of force but could not stem the tide of mechanization that swept his own view away and layed bare what was at its bones: a local, mechanical world view. This picture has been just completed by the discovery of gravitational waves, i.e. effects of gravitons, the virtual exchange particles of the gravitational force. Abbot, B. P., & LIGO Scientific Collaboration and Virgo Collaboration. (2016). Observatoin of gravitational waves from a binary black hole merger. *Physical Review Letter, 116*(061102).

uses the example of two clocks that are attached to the same board and that, after a time, get entrained in the movement of their pendulums, because their vibrations refer back to the same common background, the board they are screwed to. Thus, in Leibniz the principle of non-local coordination has also a concrete physiological scope, namely to understand how mental and physical events could be possibly coordinated. So Leibniz has paved a way here by pointing out that whenever consciousness plays a role perhaps non-local relationships should also be expected.

Importantly, it seems that history has proved Leibniz wrong and Newton correct. At least the scientific mainstream has followed along those lines that were laid out by Descartes and Newton: along the lines of mechanization and thorough local causality. Why is it, then, that I propose, in what follows, that we should shift our gear and change from figure to ground, or in other words, give up what has been so successful for what obviously has not had the same success? Why on earth would one want to do this?

My proposal is motivated by at least two points:

For one, I am not saying we should give up the conventional stand and shift the paradigm completely. I am saying that sometimes and for certain purposes it might be useful to shift back to the background, and for others it might be useful to stay with the foreground. For all practical purposes in everyday life our current model serves us well and does not have to be abandoned. But in order to integrate experiences, anomalies and concepts that defy such a local mechanisation, a shifting of paradigm might be useful.

Thus, secondly, I would hold that we have certain situations and instances where the mainstream narrative is not useful and where the Cartesian-Newtonian model of local-causal mechanisation is the wrong approach. My guess is that most of psychology and consciousness studies belong to this category of processes, but perhaps also others. Here the Leibnizian paradigm, so to speak, might be more useful, or in other words a non-local model of inner relations.

What might such a model look like? And what could or should it achieve? And in what sense could it be superior to a standard classical approach? To start with, we have developed a theoretical framework that might yield an alternative approach. I will now develop an outline of such a model in plain language. Whoever is interested

in the formal aspects of the model I would like to point to our more formal original publications (Atmanspacher, Filk, & Römer, 2006; Atmanspacher, Römer, & Walach, 2002; Filk & Römer, 2011; Römer, 2004; Römer & Walach, 2011).

The Model of Generalised Quantum Theory

Our model starts from a very obvious and indeed simple intuition: If a theoretical approach was so utterly successful in physics as quantum theory was, the physical quantum theory might be just an exemplar of a very general theory or model of the world at large. Put differently: If quantum theory is a correct modelling of the material reality, why should its principles not also be applicable to other realms of reality, given that some of the original conditions hold? And if so, what would be those conditions? We started by assuming that a generalised version of quantum theory might be useful for other situations that are in structure similar to the situation that produced physical quantum theory and asked ourselves the question: What is it that is the generic core of any theory to be a quantum theory, physical or otherwise? What theoretical structure makes a theory a quantum theory and sets it apart from any classical theory? And might there be useful examples for the application and the scope of such a theory? We thus tried to distil the core out of quantum theory. Such a process has benefits and pitfalls. The benefits are clearly that the application can then be much broader. While physical quantum theory or quantum physics proper can only applied to material systems of a certain nature, a generalised quantum theory (GQT) can be applied to any system. That also underlines a very, very important distinction: our generalized theory GQT is *NOT* a physical theory. [54] It does not extrapolate the reach and scope of quantum physics into other areas, thus committing a severe category mistake. This is *NOT* the case and *NOT* the purpose. It is important to emphasise this, as many recipients or our theory and many quantum-enthusiasts and quantum-pop-stars fail to differentiate here. We use this differentiation, and yet hold that there may be situations and certain niches of reality where such a description might be useful. The downside of such an approach is also obvious: While physical quantum theory (PQT) or quantum physics proper is a very precise theory that can be used to make numerical predictions and develop quantitative tests, GQT is too generic and only phenomenological at present. There is certainly scope for stronger quantification in the future, but for that more data are needed and modelling of this data. This also describes a huge danger which we are well aware of: If used

[54] Whenever I speak of the physical quantum theory I will be using terminology like physical quantum theory or quantum mechanics. Whenever I speak of a generalised version I will be using generalised quantum theory (GQT) or just, generically, quantum theory.

indiscriminately and uncritically, it can become an instrument for the analytically lazy to not bother further with classical or otherwise deeper understanding of phenomena. This is something we certainly do not advocate. We see the danger, but you cannot prevent that useful instruments are used in uncritical, stupid or even dangerous ways by the users.[55] Thus, the fact that the model can be misused is clear but should not prevent us from working with it.

Having posted all these caveats, what is the specific scope of the model? In very simple language, generalised quantum theory (GQT) is a theoretical model for all situations where *incompatible observables* are present in a system and those observables are needed to describe the full situation.

These are the most important elements of the model:

1. We assume that we can divide the world meaningfully into systems that can be at least conceptually isolated from a background for the purpose of inspection and study. This is the notion of a system.
2. We assume that within systems parts can be made out or described, subsystems within systems as it were.
3. We also assume that such systems can be described by observational processes, i.e. we can define what we want to observe or measure. Such a process is a constructive measurement process. In the simplest case a measurement will yield the result 1 for “true” and 0 for “false”, for instance if we ask binary questions about a system such as “Is the system dead or alive?”. Whatever can be observed or measured in a system we call “observable”.
4. When an observable is measured, i.e. observed and the result of the observation determined with respect to a certain question, the observable has a certain value, often called Eigenvalue. And a second measurement will yield the same value.
5. A system can be defined by more than one observable.
6. Some of these observables will be compatible with each other. That means that we can measure these observables in any sequence we like, and the measurement of one observable will not impact the other. Note that this is the case with all classical systems. For instance, I can measure the length of a person and her weight, or the other way round. The measurement of the length

[55] The fact that someone tries to dry her cat in a microwave oven only to find the pet dead does not speak against the use of microwaves in general.

will not impact the measurement of the weight.[56] Such observables are compatible.

7. Some systems may contain *observables* that are *incompatible*. These cannot be modelled classically because the sequence of the measurement makes a difference. In other words: the measurement changes the measured object. Whenever such a situation holds, it calls for a quantum formalism to model this. In other words: GQT is there to theoretically capture cases where incompatible observables are present. While in classical physics one can measure the trajectory of a canon ball and its location, and the sequence in which we do this does not change the trajectory or the impact of the canon ball, in quantum physics the measurement of location of a particle and the measurement of its moment are mutually exclusive in the sense that a precise knowledge of a particle's location excludes precise knowledge of its momentum and the other way round. The Heisenberg uncertainty relationship is an expression of this situation, and another way of saying the same thing is that measurement impacts on the measured object, or the sequence of the measurements is relevant. For, if we measure first location and then momentum in a quantum system, the result will be different from a situation where we measure first momentum and then location. This is formally captured by an algebra of non-commuting operations, and this is the core of both, the generalised, and the proper quantum formalism. It leads to the uncertainty relationship, and this is what makes the formalism "non-classical". In other words: *The capacity of the model to deal with incompatible operations or observables is the core that makes the model a quantum model.* It is applicable whenever we have situations where measurement changes the measured object, or where we have incompatible observables that are needed to describe one system. Another term for "incompatible" is "complementary". Complementarity was never clearly defined by Bohr who introduced it (Bohr, 1966). It means situations where two descriptions are necessary for one and the same object or situation or process that are maximally incompatible and

[56] Strictly speaking, even that is not true. For my measurement of length will take time during which a person will need some of the energy to live, breath out humidity, etc. and thus lose a small amount of weight, which would be different, if I were to measure weight first and then length. But for all normal purposes this example holds true.

yet necessary to describe the situation. Above we have used the relationship between mental and physical properties as an example.

We normally are only used to dealing with simple opposites. Logically speaking we can express one as the negation of the other. Thus, darkness is the lack of light, and white is the absence of any blackening pigment. But incompatible observables are placed on different conceptual planes: they can both have maximal or intermediate values at the same time. Red and green are complementary colours and one is not expressible as a negation of the other. Our point is: probably we have more situations where incompatible or complementary observables are relevant than we think. We only have not dealt with this situation properly, because classical frames of reference are not used to dealing with such situations. We have pointed out in previous publications where such situations may occur (Walach & Stillfried, 2011) and give a few examples in Table 1. We can immediately see from this very tentative list that there may be quite a few situations, where incompatible observables might be expected, and thus a generalised quantum formalism is applicable. I give a few typical examples.

I would hold that in all situations where consciousness plays a role such a situation may be present. For instance, if we try to register consciously what is currently bothering us, we are thereby changing our affective state. In other words: our "measurement" of our inner state changes it, and thereby impacts our affective state immediately. Atmanspacher and Römer (2012) have shown that this is relevant for order effects in questionnaires. Dependent on the sequencing of items within a questionnaire results will differ. This is a clear sign that incompatible observables are at work and a quantum framework needs to be applied. Pothos and Busemeyer (2013) have made a point that experiments in cognition can be better modelled if a quantum formalism is applied that contains a term that represents a non-factorisable state of a joint distribution of two variables that is typical of quantum theoretical systems. Aerts (2014) has shown that perception and cognition are, in very general terms, processes that need to be modelled by a quantum-like formalism.

Table 1 – Examples of Typical Situations with Incompatible Observables (modified after Walach & Stillfried, 2011)

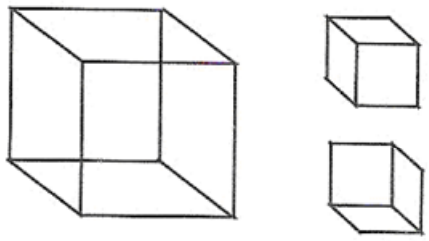
Physics Proper		Realm
Location	Momentum	Description of a particle
Energy	Time	Description of a wave
Determinism	Indeterminism	Description of a quantum event

Generalised Context		Realm
Physical	Mental	Description of an individual
Structure	Function	Description of a system
Substance	Process	Description of a system
Science	Spirituality	Epistemological approaches to reality
Individual	Connectedness	Description of a human being
Separation	Community	Description of human systems
Reality	Potentiality	Description of developments
Knowledge	Uncertainty	Description of decision contexts
Cognition	Affect	Relationship to the world
Conscious	Unconscious	Self-Knowledge
Analytical	Holistic	Styles of thinking
Good	Evil	Description of morality
Form	Content	Art
Emptiness	Fullness	Metaphysical notion in Buddhism

If participants are presented with a so-called Necker-cube image (see Figure 2), it is interesting to study how this perceptual-cognitive system behaves. Atmanspacher and colleagues have developed a theoretical model, the so called Necker-Zeno-model, and made empirical predictions based on the formalism of GQT (Atmanspacher, Bach, Filk, Kornmeier, & Römer, 2008; Atmanspacher, Filk, & Römer, 2004). This model

relates the various time scales on how long the visual system resides in one of the states to each other and makes predictions that can be empirically tested. Some first data support the predictions of GQT (Kornmeier, Friedel, Schmidt, Atmanspacher, & Wittmann, 2015; Wernery et al., 2015).

Figure 2 – Necker Cube



These first data show: In principle, GQT is applicable wherever we have a situation where measurement impacts the measured object or process, or in other words: Whenever observables describing a system are incompatible, we need a quantum-like modelling approach as we have proposed with GQT.

Generalised Entanglement

A curious and quite counterintuitive phenomenon follows as a consequence from the formalism of quantum theory: entanglement, also known as non-local correlations. The term “entanglement” was coined by Schrödinger in 1935. He analysed the formalism of quantum mechanics and saw that, in composite systems that are governed by the same equation, parts of the system that are separated in space behave in a coordinated way although there is no coordinating signal. This is why Einstein, who was quick to spot problems with the new theory, pointed out that this was”ghostlike action at a distance”, something that was not allowed by special relativity, and that, therefore, quantum mechanics cannot be a final and true

description of reality (Einstein, Podolsky, & Rosen, 1935). Therefore these non-local or entanglement correlations are also referred to as Einstein-Podolsky-Rosen or EPR correlations in physics.

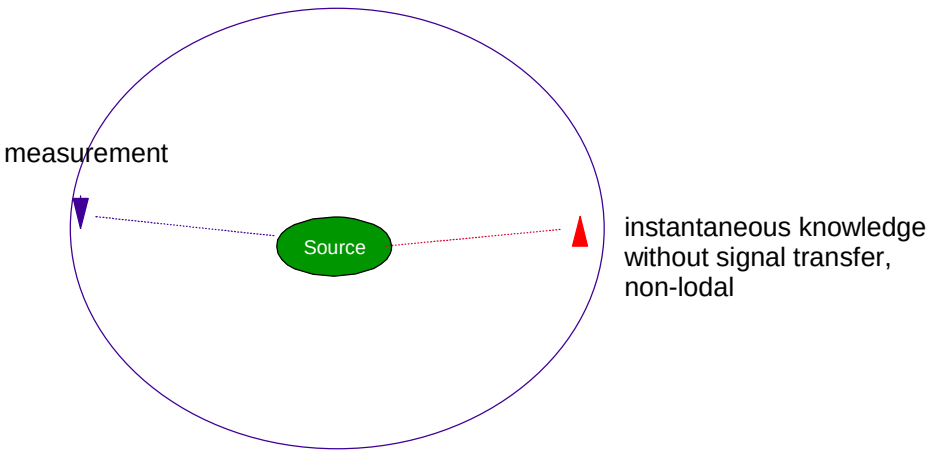
At the time this was a mere thought experiment and curious anomaly. In the 1960ies the Irish physicist John Bell developed an argument based on joint probabilities of anticipated results in a two-particle system (Bell, 1987). He asked the simple question what types of results would one get, if, in a system that consists of two particles joined together in one quantum system, one were to measure a quantum property such as polarisation angle of photons if the photons were independent of each other or correlated. Clearly, quantum mechanics would predict correlated measurements, while a classical approach would predict that spacelike separated particles that are measured at the very same moment should exhibit uncorrelated values as there is no time for any "coordination signal" to travel between the two particles. The predictions Bell derived from the formalism are formulated as inequality relationships of sets of jointly measured values. They mark the boundary of what by pure combination can be expected, if the two particles behave as separated and that should be violated if they are correlated.

This paved the way for experimental testing. Such experiments were finally carried out in the late 1970ies. In these experiments a light beam is shone through a crystal which splits the beam into two correlated half-beams, as it were. The resulting photons are correlated and need to be treated as one system, governed by the appropriated quantum theoretical Schrödinger equation. One measurable observable of light is its polarisation. The polarisation of light is the plane along which the light beam vibrates as the light wave propagates. This polarisation angle can vary but will be determined by the physics of the light beam. Now, if the photons are split into two correlated halves, the theory determines what the outcome of the full polarisation measurement of both photons together will be, but not which angle will be measured in one of them. But if a certain angle is measured, then the knowledge of the polarisation angle in the other photon is instantaneous, because they behave as a correlated whole. Figure 3 tries to capture this in a somewhat simplified manner.

In reality, the polarisation measurement devices in the two light beams are set at particular predefined angles. If quantum mechanics is correct one expects more correlated measurements than if the two beams would behave independently, as predicted by a classical theoretical model. It turns out that Bell's inequalities were violated and the photons are indeed correlated. Quantum mechanics was proven

correct. Since the first experimental realisation by Aspect and colleagues in 1982 (Aspect, Dalibard, & Roger, 1982; Aspect, Grangier, & Roger, 1982), many experiments have been performed, each one trying to close a loophole that critics found. Meanwhile, EPR-correlations have been used to conduct experiments with many kilometres between the polarisation measurements, as well as delayed choice measurement, where the measurement angle has been set after the photon has been emitted (Gröblacher et al., 2007; Ma et al., 2012; Pan, Bouwmeester, Daniell, Weinfurter, & Zeilinger, 2002; Salart, Baas, Branciard, Gisin, & Zbinden, 2008; Stefanov, Zbinden, Gisin, & Suarez, 2002). All these experiments prove beyond any reasonable doubt: In systems governed by quantum mechanics proper entanglement correlations are real. The consensus within the physics community is such that experimental applications, such as teleportation (Bouwmeester et al., 1997), quantum computing (Duan, 2011; Nielsen & Chuang, 2000; Olmschenk et al., 2009; Svozil, 2001) or quantum encryption (Svozil, 2001) are already being studied and are partially realised in an experimental laboratory environment. Thus, within physics proper entanglement correlations are mainstream.

Figure 3 – Schematic of an EPR-experiment: A light source emits a light beam split in half. The resulting half-photons are measured, for instance their polarisation angle. While it is undetermined which angle will be initially found, as soon as one is measured the other one will exhibit a correlated value. Since there is no signal transfer between the two photons, it is called non-local correlation.



The interesting question now is: Does this have any parallel in the generalised case? And indeed, it does. This is so, because entanglement is in fact only a special case of complementarity or incompatibility, namely an incompatibility between the description of the full system, an observable pertaining to the whole, and a description of a part of the system or local observables. This can in fact be gleaned from the analysis of the formalism itself. *Complementarity or incompatibility between a global observable, describing the system as a whole, and local observables, describing parts of the system is tantamount to non-local correlation between the parts*. Using the example above: The global observable is the total polarisation angle of the full two-photon system. This is determined by the theory. But it is completely undetermined which polarisation angle the first measured photon will exhibit. Hence we see an incompatibility between the global observable (full polarisation angle known) and local observables describing the parts of the system (initial measurement undetermined). The incompatibility is between full knowledge of the whole system and the complete indeterminacy of the first measurement. This incompatibility drives the correlation of the subsystems, as it were.

And in the very same sense, the formalism of the generalised quantum theory would predict generalised non-local correlations or generalised entanglement (GET) between systems if they have the following conditions:

- There is a system that can be analysed into subsystems.
- There is a global observable that describes the full system, and
- There are local observables that describe the subsystems, and
- These global and local observables are incompatible or complementary.

Whenever these conditions are met, we would expect non-local correlations between these subsystems. This situation has been graphically depicted in Figure 4.

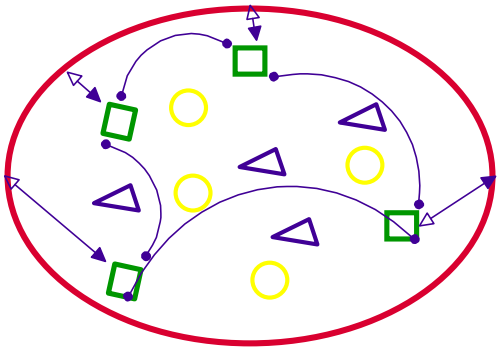
This is nothing but a very theoretical and also very general prediction at this point. However, we would hold that this model can be fruitfully used to understand various empirically known phenomena that are very difficult if not impossible to integrate into a classical framework. We cannot go into details here and point the interested reader to the original publications. GET has been used as an explanatory framework to understand

- Telepathy, psychokinesis and precognition (W.v. Lucadou, Römer, & Walach, 2007; Walach, von Ludacou, & Römer, 2014)
- Transference and therapeutic phenomena in psychotherapy (Walach, 2007)

- Therapeutic effects in complementary medicine, such as spiritual healing, homeopathy and other effects of intentional healing (Walach, 2003, 2005)
- Correlation effects in standard placebo controlled clinical trials (Walach, Sadaghiani, Dehm, & Bierman, 2005)
- Effects and importance of rituals (Walach & Römer, 2016)
- A redefinition of the concept of life energy or Chi (Walach, 2005)
- An understanding of morality (Walach, Stillfried, & Römer, 2009)
- A novel understanding of spirituality (Walach, Kohls, Hinterberger, Stillfried, & Schmidt, 2009)
- A theoretical understanding of the phenomenal duality of mind and body or consciousness and physical reality with one and the same reality as background (Römer & Walach, 2011; Walach & Römer, 2011).

These are theoretical reconstructions of phenomena and hence post-hoc. The model also makes predictions, for instance of a hyperfast coordination system within the body, that could be experimentally tested. But such tests have not been conducted so far as the calculations and measurements associated with it are not trivial. But the decisive question is: Is there a potential prospective experimental test?

Figure 4 – Generalised Entanglement can be expected between elements of a system, if local and global observables are complementary or incompatible; local observables: squares; global observable: ellipse; arrows indicate incompatibility; lines indicate nonlocal correlations



Towards An Experimental Test of the Model

The proof of a good model is not only in that it can unify a lot of diverse phenomena that otherwise count as anomalies. We have shown that our model can actually do this. But the final proof lies in an experimental testing procedure. It is here that things become a bit tricky and messy. Let us step back and understand how the experimental proof worked in physics. Let us recall: There were theoretical predictions, within a quantitative measurement model of Bell's inequalities. These could be used to derive predictions about correlated measurements. The measurements were performed and tested against the theoretical prediction. Since the theoretical prediction of independence was violated the correlated nature of the underlying photons was accepted. Exactly a similar analogue does not exist in the generalised case, because there is no possible Bell-type inequality, as the theory is as yet too general.

Now, and this is very important to understand, all classical experimental tests that have been conducted in all these fringe areas such as parapsychology, homeopathy or spiritual healing actually work on the presupposition of testing for a local, causal signal. They cannot be used to test systems that are based on generalised entanglement correlations (Lucadou, Römer & Walach, 2007). For, entanglement correlations must not be used for the transmission of causal signals. If they are so used, the correlations break down or change their sign. This can be proven for entanglement correlations proper (see Lucadou, Römer & Walach (2007) for a formal proof), and is assumed to also hold for the generalised case. We assume this as a theorem, the "No-Signal Transfer" theorem, or NT theorem. This seems to be necessary to not violate special relativity. For; if we were able to use non-local correlations as signals, we would create time reversal paradoxes. We would be able to signal into the past, ordering our grand-mother to be killed, which would prevent us from doing this in the first place (Fitzgerald, 1971).

Now, every classical experiment that juxtaposes a treated group next to a control group in a randomised fashion, including blinding and all, is in fact a local cause detector. It is set up such as to discover a local-causal correlation between treatment and outcome. And in fact, if the experiment were to be repeated, one might even consider using the outcome of the first experiment to code a signal: whenever, in a replication experiment, an individual outcome is above the mean of the first experiment, we code a "1" or a hit, and whenever it is below the mean of the first

experiment, we code a “0” or a miss. Note that the physical experiments that discovered physical entanglement correlations were of a different type: they matched predictions with natural streams of data. Classical experiments in psychology, medicine or biology don’t do that. They derive their causal correlations against a control group. This is a different set-up prone to distil a causal signal from the data.

This is in our view the reason why empirical programs to prove, for instance the reality of PSI (anomalous cognition such as telepathy or clairvoyance or psychokinesis) have failed so far and will fail in the future (W.v. Lucadou, 2015; Walach & Jonas, 2007; Walach, Kohls, et al., 2009). The same applies to other systems that are based on such processes, such as homeopathy or spiritual healing. This also marks our problem:

We need a kind of meta-experimental framework that transcends the fishing for local causality and yet allows for the standard preconditions of empirical, experimental data: to be intersubjectively robust against replications. An experimental result that comes with a sticker attached “do not replicate” won’t count as empirical proof.

In this situation we conducted a replication of an existing promising model. Since the original paper is currently under review we cannot report the original data but only describe them, as was done in various meetings (W v. Lucadou, 2015; Walach & Horan, 2014). The set-up is a classical psychokinesis (PK) experiment that is meant to demonstrate the direct influence of a human intention on a physical system. A random event generator (REG) – made of a Zener diode that is attached to a counter current that leads to random events that are sampled – is attached to a computer and drives a display, in our case a fractal ribbon of a Mandelbrot type. As a result, the fractal grows or shrinks unpredictably. On the computer screen, on top of the fractal, an arrow is placed that is the experimental instruction to either grow the fractal intentionally, shrink it intentionally, or keep it unchanged in the middle. The instruction is directed towards a human operator, a voluntary participant in the experiment. The participant has the information that he or she is meant to “influence” the behaviour of the fractal by sheer will or intention to move into the indicated direction. The participant also knows that the fractal is driven by a REG and hence cannot be influenced by classical means. The participant is instructed to progress the experiment step by step – in fact the sampling process that drives the fractal – by pressing either of the shift keys on a computer. What the participant does not know, but can find out by trying is that pressing both keys at once will also progress the experiment and speed up the sampling process as long as both keys remain pressed.

Each experiment is made up of nine runs, each with 80 sampling steps or trials. Three runs are associated with the “grow” instruction, three with the “shrink” instruction and three with the “keep stable” instruction. Out of each run we generate 5 psychological variables, and 5 physical variables. The psychological variables are the number of key presses right, left and double, as well as the time needed for each run and the variance of the time, i.e. how steady the progression of the run was. The physical variables are a bit technical. One is the actual number of hits, i.e. correspondences of the movement of the fractal with the instruction, the difference, i.e. the number of steps the fractal was away from the optimum, the difference between the theoretically expected behaviour of the REG and the actual behaviour, the voltage at one of the channels of the REG and the variance of the voltage.

Thus, we have 5 physical variables per run and 5 psychological variables. As we have 9 runs per experiment, we get 45 physical and 45 psychological variables per experiment or a matrix with 2025 cells (45*45). If we now do this experiment many times, we can correlate these physical and psychological variables across all participants, using a simple correlation formula. In fact, we conducted 503 experiments with 243 participants. Now, if you correlate many variables you will always find significant correlations by chance. The significance level indicates how many correlations will be significant by chance. Thus a significance of $p = 0.05$ means that when you calculate 100 correlations between variables you will see 5 significant correlations just by chance.

Our expectation would be that, if entanglement correlations hold between the participant and the physical system, then we should see significantly more correlations within our correlation matrix than expected by chance. Thus, we do the experiment, calculate the correlations for our 45*45 variables and count the number of significant correlations we get. We get a large, 2025 cell matrix of correlation coefficients and their significance level. We count the number of significant correlations and compare this number with what is expected by chance.

In addition we also construct a control experiment. This is done by a simple step: We let the system of the REG and the display run empty. No participant is required to move the experiment forward. The data of this control experiment are saved automatically, yielding the physical variables. And in a second step we paste the psychological variables of the according experiment into the data set, also automatically. This makes a control experiment. We calculate the correlations for the control experiments in the same way. And we compare the number of significant

correlations in the experimental matrix with the number of significant correlations in the control matrix statistically. Thus, we have two measures: The number of correlations expected by chance versus the actual number of correlations in the experimental matrix. And the number of correlations found in the control experiment compared with the number of actual correlations in the real experiment. Because the standard statistic makes some assumptions that are not met by our data, we also used a much more conservative estimate by simulating 10.000 such experiments on the computer and deriving a distribution from this simulation against which we gauged our results. This is a so called Monte-Carlo or permutation analysis. An independent reviewer, Hartmut Grote of the Max Planck Institute of Gravitational Physics in Hannover, checked our data and did the analysis once more, independent from us, replicating our findings.

With a classical analysis we see more significant correlations in the experimental matrix than we see in the control matrix. In fact, the control matrix conforms well to chance expectation, although, due to the internal dependence of some of the variables, we see some more correlations in the control matrix than expected by chance. But the important outcome is that the number of significant correlations is much higher in the experimental matrix. By standard analysis methods the difference is roughly 5 sigma or 5 standard deviations of the normal distribution, where the conventional significance threshold is just below 2 sigma. In physics, 5 sigma is normally seen as a robust result, and Richard Horton, the editor of the medical flagship journal Lancet has just complained that medicine practically never meets that requirement (Horton, 2015). In view of this, our results are quite spectacular and a robust empirical hint that there seems to be some non-local correlation between physical system and participant. Our Monte-Carlo analysis reduces the significance to more modest levels, but still holds up. This is not surprising, as this is a very conservative analysis that also destroys some of the inherent properties of our experiment. What in our view is most important, however, is the fact that his was already the fifth and now partially independent replication of the experiment (W. v Lucadou, 2000; W. v. Lucadou, 2006; W v. Lucadou, 2015; W.v. Lucadou, 2015). Our experiment was independent in the sense that we re-engineered the whole set-up: reprogrammed the computer, re-built the REG devices, used new hardware, used new experimenters and new personnel. It was only partially independent, as Walter von Lucadou, the original inventor of this experimental set-up, was also part of the experiment in that he advised us right from the beginning and conducted also some experiments himself, but only a small number.

We have shown a potential way to investigate the reality of generalised entanglement correlations experimentally, without violating the boundary conditions. That means: Our system is free to exhibit the correlations anywhere in the matrix.

If looked at the experiment classically, and if one were to distil a signal out of it, one would have to predict the precise position of a significant correlation in the matrix. And exactly this is what is prohibited by the model. Hence our expectation would be: we will probably see, in a second experiment, a similar number of significant correlations, but not in the same array of cells as the first time. Indeed, the position of the significant cells is irrelevant to us, as only the number of significant correlations is counted. That way we circumvent the NT theorem, we hope, and still provide an experimental model. Now it should be replicated by a large consortium of researchers, and currently we are in the process of organising this.

In sum, we would hold that this experiment is a potential proof of a generalised version of entanglement. Before it will be accepted by the scientific community at large, it would need to be really independently replicated, ideally by a group of critical scientists as well. And currently we do not know whether this will be possible.

Leibniz Revisited

I hope I made clear that this is an experimental inroad into the very structure of the universe, experimental metaphysics, as it were. Should our expectation hold true this would be a strong support for the idea that a generalised form of non-locality actually exists. This is what Leibniz had predicted: Non-local relations between elements of our world. Our model is a systemic theory. It would not let us expect non-local correlations between everything, but between elements of a system and between other systems as they are themselves subsystems of larger systems. In fact it would yield a non-local coordination mechanism. This would not have to contradict or outrun classical causality, but rather support and complement it. While in the physical world, normally, causal mechanistic relations are dominant and non-local correlations are supplementary, in the mental world it might actually be the other way round. Quite along the lines of Leibniz who said that the material world knows causes (Ursachen) and the mental world reasons (Gründe), recognising the difference between them. But the non-local coordination mechanism that Leibniz used to call pre-established

harmony has not found any physical reality so far. Entanglement correlations in physics proper and in the generalised version might afford us with such a “mechanism” of coordination. If this is true, it is really a change of figure and ground: what used to be in the background, namely relations, will move to the foreground and become the figure, namely the relations between elements, even though they may “only” be a-causal and non-local, but nevertheless real and in fact powerful.

Our world might indeed be structured in a way that a non-local coordination process coordinates singular events and individuals, such that relationships become primary and individuals secondary. This is, by the way, quite similar to some Buddhist ontologies that speak of interdependent causation (Odin, 1982). Leibniz, I hope I made that clear, is actually more modern than most people would think, and in fact his perception penetrated even deeper than Newton’s: into the very fabric behind individual appearances.

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Harald Walach

(Professor, Dr. phil., European University Viadrina, Frankfurt a.d. Oder/Germany)

walach@europa-uni.de

REMARKS ON THE PHILOSOPHICAL FOUNDATIONS OF THE ORIGIN-OF-LIFE STUDIES

Włodzimierz ŁUGOWSKI (Warsaw / Poland)

1. Introduction

The essence of the science dealing with the origin of life, called protobiology, is based on the idea of evolutionary formation of the first living beings from non-living matter. Now, after several score of years' progress of protobiology[57], such proposition appears to be a truism. It would be noticed at a glance in any review paper[58] on this subject where one can find approximately such statement: in contrast with the former, pre-scientific, conceptions accepting the possibility of origination of life directly from the non-living matter, even under contemporary conditions, the starting point of the present studies is based upon the thesis that the way from inorganic matter to living systems had to be mediated by a long-lasting chemical evolution proceeded under conditions radically different from these existing on the surface of the Earth now. In short: without acceptance of the idea of chemical evolution it would be difficult to imagine the scientific studies on biogenesis. This thesis is generally accepted by both scientists and philosophers.

However, the agreement stops at the same point at which it begins. At least the agreement between the scientists, while the philosophers appear to be amazingly concordant where consensus – owing to different orientations – should rather not be expected. I'll demonstrate that at the source of many lately declared views concerning the philosophical foundations of the origins of life studies – views both of scientists and philosophers – there is a misconception of fundamental nature. I'll

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[57] Historians acknowledge the year 1957 to be the groundbreaking date in the process of developing the biogenesis science when the first international symposium (let us add: in a representative circle) on this subject took place. So e.g.: S. Podolski, The role of virus in origin-of-life theorizing, "Journal of the History of Biology" 1996, v. 29, s. 79-126; J. Strick, Creating a cosmic discipline. The crystallization and consolidation of exobiology, 1957-1973, "Journal of the History of Biology" 2004, v. 37, s. 131-180.

[58] P.L. Luisi, F. Ferri, P. Stano, Approaches to semi-synthetic minimal cell, "Naturwissenschaften" 2006, v. 93, p. 1; J. Bada, How life began on Earth. A status report, "Earth and Planetary Science Letters" 2004, v. 226, p. 1-15,

try also to reveal some sources of this misconception and its sometimes peculiar consequences.

For it must be admitted that at least some of these consequences may seem indeed striking. For instance: how it is possible that many known scientists treated a philosophical dissertation written, from the beginning to the end, from anti-evolutionary standpoint, as a scientific work; moreover – as a model of methodological correctness of grasping the problem of the origins of life? Such reception of a creationist dissertation published some time ago[59] (now considered a forerunner of the "intelligent project" movement) may be treated as peculiar, but in some way exceedingly instructive example of misunderstandings in ontological and epistemological foundations of protobiology and, indeed, of the natural sciences in general.

Then, in the introductory part of my considerations – besides a short survey of the results of protobiology and preliminary characteristics of its philosophical basis – I formulate a warning, namely that philosophical statements of scientists may not be literally accepted. Although protobiology is already treated as 'mature' branch of science (in such meaning in which formerly biology was considered to be 'immature' and now 'mature' in relation with physics) it is not free, however, from different kind of myths and stereotypes. An exemplification and more rigorous support of this thesis may be performed by the analysis of a range (both classical and contemporary) theories of biogenesis, representative, as it seems, for different trends of the scientific studies on the origin of life[60]. In the following, some ways will be shown of avoiding difficulties considered by many authors to be insurmountable, which apparently are only scientific, but in fact philosophical issues.

2. The idea of chemical evolution: its empirical premises and the philosophical one

What are the sources and premises of the idea of chemical evolution? (1) First of them is the extrapolation of Darwinian concept of evolution into the non-living world;

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[59] Ch.B. Thaxton, W.L. Bradley, R.L. Olsen, The mystery of life's origin. Reassessing current theories, New York 1984 Philosophical Library.

[60] It is done in my monograph: W. Ługowski, Filozoficzne podstawy protobiologii, Warszawa 1995 IFiS PAN Publishers [Philosophical foundations of protobiology].

one can speak also, in philosophical terms, about the idea of the history of matter[61]. (2) Supposition, that the primitive atmosphere was reductive and contained such gases as methane, ammonia, carbon monoxide, hydrogen and water vapor, in contrast to contemporary oxidizing atmosphere. (3) Supposition that the first organisms were heterotrophic. (4) Biochemistry: all the living world is build up from the same biochemical constituents, twenty amino acids, four nucleotides, some sort of sugars, etc. (5) Cosmochemistry: most abundant in cosmos are the same elements which are the main constituents of living beings. (6) Paleobiochemistry: traces of early living beings and/or of their activity.

What concerns the evidence for the idea of chemical evolution, there cannot be any direct evidence for its first premise, because of its philosophical character. But the geological studies on the Earth core and primitive atmosphere formation, and also comparative planetology, gave some support for the second premise; with the third – situation is similar. What concerns the fourth, the results of multiple experiments (followed that of S.L. Miller [62]) conducted in various conditions were very encouraging. [What was especially exciting, that in such an experiments we obtain exactly this types of substances which we can find also in living beings. There are, for example, many amino acids possible from the chemical point of view, but we obtain mainly those, which are biologically important.] Also, multiple traces of early life has been found[63] – treated as an evidence of chemical evolution.

3. Theories of the origin of life: (many) apparent differences and (one) common denominator

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[61] "Die philosophisch wichtigste Entdeckung der neuzeitlichen Naturwissenschaft ist wohl die Geschichte der Natur", C.F. von Weizsäcker, Vorwort, in: B.-O. Küppers, Der Ursprung biologischer Information. Zur Naturphilosophie der Lebensentstehung, München 1986 Piper, p. 9.

[62] S.L. Miller, A production of amino acids under possible primitive Earth conditions, "Science" 1953, v. 117, p. 528-529. Cf: J.L. Bada, A. Lazcano, Prebiotic soup – revisiting the Miller experiment, "Science" 2003, v. 300, p. 745-746. Recent summary of amino acid syntheses under prebiotic conditions see: D. Fitz, H. Reiner, B.M. Rode, Chemical evolution toward the origin of life, "Pure and Applied Chemistry" 2007, v. 79 (12), p. 2104.

[63] Recent review: J.W. Schopf, Fossil evidence of Archean life, „Philosophical Transactions of the Royal Society of London. B. Biological Sciences" 2006, v. 361, p. 869-885.

Current theories of the origin of life were identified and analyzed[64], their methodological and ontological assumptions compared with the explicit statements made by occasion by their authors [see: Appendix].

What concerns the mode of explanation of the transition "non-life into life", i.e., the driving force of the chemical evolution, a great variety of solutions have been observed, e.g.: chance formation of the first information-carrying molecule (Muller); chance formation of the first autocatalytic loop (Calvin); physicochemical interactions, e.g. Van der Waals force (Black); mineral prescription (Bernal); the universal law of integration (Bahadur); the sociability principle (Novák); selforganization explained in physico-chemical terms (Eigen, Ebeling); selforganization explained in biochemical terms (Folsome, Weber); environmental selforganization (Kuhn); spin-glass formalism (Anderson & Stein); broken symmetry and the biogenesis as a cosmos-earth joint venture (Greenberg, Krueger & Kissel), eternity of biological information (Wald, Fox, Fong, Portelli).

The differences between the theories, however, as well as the current controversies in the scientific community (RNA-world first, thioester world first, inorganic pyrophosphate first, proteinoid first, primitive metabolism first, thermosynthesis first, etc.) may be shown to be of secondary importance in comparison with the main ontological assumptions underlying the origin of life studies. The common denominator of the current theories of biogenesis may be expressed briefly: life is a natural emergent property of matter[65]. It is nothing more and nothing less than another formulation of the first – philosophical – premise of the idea of chemical evolution (see above). It is also nothing more and nothing less than the essence of the "new (non-mechanistic) philosophy of nature", as postulated by Ilya Prigogine[66].

From the methodological point of view, one can divide current theories in two groups: qualitative, which are similar to classical theories of biological evolution, and quantitative, more close to physical theories. The authors of the classical theories in most cases starts from such or another hypothesis concerning primeval conditions and try to construct possible scenario of biogenesis. The authors of the latter type of

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[64] W. Ługowski, Theories of life's origin. Philosophical encyclopaedia, in press.

[65] P.L. Luisi, Emergence of life. From chemical origins to synthetic biology, Cambridge 2006 Cambridge University Press, p. 123.

[66] "Nature must be described in such a way that man's very existence becomes understandable", I. Prigogine, I. Stengers, Order out of chaos. Man's new dialogue with nature, Toronto 1984 Bantam Books, p. 83.

theories try to find an answer for another, more general question: how matter can organize itself? Let us take a look at the prominent example of the second type of theories, namely theory of the self-organization of matter. The first of "the most important steps in the transition from the non-living to the living"[67] occurs in a gas phase, in the primitive atmosphere. The second stage – in the water (as in the "classical" scenario of chemical evolution).

4. Crisis in the origin-of-life studies? Luck of place, luck of time or luck of (philosophical) consciousness?

But could really such a sequence of reactions, from small organic molecules to protocells, occur in ocean? The critics say: no! It is impossible from the thermodynamical point of view: the destructive processes would dominate. It is the first objection, but not the last. The second is, that there is no geological evidence for prebiotic soup to exist[68]. Even if such a prebiotic soup ever exist – says the critics – it was only through the relatively short period of time, much too short for chemical evolution to occur[69].

Since we have no evidence for prebiotic soup – the argument goes – the first premise of the idea of chemical evolution (let us remember: the philosophical one) is also doubtful or even false. From the logical point of view such a reasoning is of course unjustified. Such unhonesty tricks, for obvious reasons, are popular in contemporary philosophical (creationist) literature[70].

But it must be something wrong in "the Danish state" when serious scientists[71] – including those who cut them expressis verbis from the ontological theses of creationism – are ready to accept such kind of reasoning (and its conclusions) as their

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[67] B.-O. Küppers, Molecular theory of evolution. Outline of a physic-chemical theory of the origin of life, Berlin 1985 Springer, p. 281.

[68] H.P. Yockey, Comments on "Let there be life; thermodynamic reflections on biogenesis and evolution" by Avshalom C. Elitzur, "Journal of Theoretical Biology" 1995, v. 176, p. 351.

[69] J. Brooks, Origins of life, Tring 1985 Lion, p. 117-120.

[70] D. Berlinski, On the origins of life, „Commentary" February 2006. H. Yahya, Atlas of Creation, v. 2, Istanbul 2007 Global Publishing, p. 688-707. W.A. Dembsky, J. Wells, The design of life. Discovering signs of intelligence in biological systems, Dallas 2008 The Foundation of Thought and Ethics, p. 207-266.

[71] Among them: H.J. Morowitz, R. Jastrow, R. Shapiro, W.I. Goldanski, J. Casti.

own. Other serious scientists, working themselves in the area of protobiology, spoke about the crisis in the whole branch. For instance: Russian chemist A.P. Rudenko, author of the theory of evolutional catalysis, defined the situation pertaining the studies of prebiological evolution as critical[72], earlier an American geneticist C.R. Woese wrote about "paradigm which course is run"[73], whereas Scottish chemist A.G. Cairns-Smith entitled one of the paragraphs of his latest book suggestively "Chemical evolution: a modern phlogiston?"[74].

However, the crisis, which in opinion of many scientists arose in protobiology, was, as a matter of fact, only a crisis of one of the ways of thinking about nature. To justify this thesis a recently published theory of the origin of life is helpful[75]. It may be shown that on the basis of this conception the difficulties which recently led to the questioning of the whole scientific basis of protobiology can be solved. We will show moreover that the aforementioned difficulties were inherent (in spite of appearances and in spite of many opinions) not only in the *scientific* but also – and chiefly – in *philosophical* assumptions of protobiology.

Now let us have a look at the directions in which the ways were sought of avoiding the above-mentioned difficulties in the classical scenario of chemical evolution. It is possible to show at least a few theories, based on – let us call it – non-classical assumptions about the conditions in which the processes of prebiotic evolution may took place. And so, the deciding meaning for the configuration of conditions and driving-forces of the prebiological evolution had: according to E.K. Markhinin's theory – the activity of over ground volcanoes[76], according to L.M. Mukhin's theory – the activity of submarine volcanoes[77], and according to the

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[72] A.P. Rudenko, Samoorganizacya i progriessivnaya evolucya v prirodnych processach v aspekte koncepcyi evolucyonnogo kataliza, ”Rossijskij khimiczeskij zhurnal” 1995, v. 39 (2), p. 55.

[73] C.R. Woese, An alternative to the Oparin view of primeval sequence, in: H.O. Halvorson, K.E. van Holde, The origins of life and evolution, New York 1980, p. 66.

[74] A.G. Cairns-Smith, Seven clues to the origin of life, Cambridge 2000 Cambridge University Press, p. 35.

[75] J. Kissel, F.R. Krueger, Urzeugung aus Kometenstaub?, “Spektrum der Wissenschaft” 2002, no. 3, p. 36-44.

[76] E.K. Markhinin, Vulkany y zhyzn’. Problemy biovulkanologii, Moskva 1980; idem, Vulkanizm, Moskva 1985.

[77] L.M. Mukhin, Planety y zhyzn’, Moskva ^{2}1984.

lately broadly discussed theory of Corliss and his co-workers – the activity of submarine hot springs[78].

Each of these theories – mentioned by way of example – avoids the majority of objections, especially of thermodynamical nature, which are broached against the classical "oceanic" scenario of biogenesis. Generally these theories were formulated with such an intention. A.G. Cairns-Smith takes up a still more radical attempt to modify the classical conception of chemical evolution with similar intention. He proposed not only different circumstances, but even a substantially different type of primary objects of evolution, namely the crystalline inorganic gene prototypes[79].

5. 'Geological eternity of life' (nec plus ultra?)

It remains, however, another difficulty, which is not and cannot be avoided by any of the recalled here "non-classical" conceptions of prebiological evolution or by any of the other, similar to them. For all these conceptions, independently from the accepted model of conditions and objects of prebiological evolution, were always accompanied by consideration whether the reconstruction of the processes which passed on the Earth three or four milliard years ago can have a universal value. The question was whether similar processes passed or pass in the extraterrestrial conditions, and if so how far they could have progressed. Regarding the Earth, it was considered that it is a most natural incubator of organic matter, not only because on it (and hitherto exclusively on it) the final effect of chemical evolution – that is the living beings – can be observed. From the time when the famous book by L.J. Henderson[80] was published up to the newest phase of discussion about the anthropic principle so many arguments were issued to support the thesis that the physical and chemical conditions on the Earth (especially owing to its particular localization in the Solar System) were favourable for the genesis of life, that a review of them – not to speak about their evaluation – would

[78] J.B. Corliss, JA. Baross, S.E. Hoffman, An hypothesis concerning the relationship between submarine hot springs and the origin of life, "Oceanologica Acta" 1981, spec. no. , p. 50-69.

[79] A.G. Cairns-Smith, Chemistry and the missing era of evolution, "Chemistry" 2008, v. 14, p. 3830-3839.

[80] L.J. Henderson, The fitness of the environment. An inquiry into the biological significance of the properties of matter, London 1913.

take several dozens of pages. Here it is enough to say: geocentrism was quite commonly accepted in prebiological evolution research – either supported by a range of arguments or simply by self-evidence.

Why then in the recent times this attitude was altered? Why the opinions concerning the crisis in the discipline got a chance of gaining publicity? This was just because some worries began to awake with the accumulation of more and more frequent reports about direct and indirect paleobiological evidence of the earliest traces of life on Earth or traces of activity of organisms, which – as mentioned before – were at first enthusiastically welcome as confirmation of the hypothetic scenario of biogenesis. But even independently of controversial character of some of these discoveries the conclusion drawn from them was quite univocal: the life on Earth existed already four milliard years ago or may be even earlier. The reason of these worries will be intelligible when one takes into account that the estimated age of the Earth is approximately 4.5 milliard years, but during the period between 4.5 - 4 mld years ago the surface of our planet was semiliquid - so it could be neither the setting of life nor even a territory adequate for early phases of the evolution of organic compounds. In other words: the earliest rocks known to us already contain traces of activity of living organisms, however as yet there has been no successful discovery of the empirical evidences of such period in the history of Earth when life on it did not exist. Some scientists are inclined to remember the idea of V.I. Vernadsky about "geological eternity of life", and concede that the beginning of life on Earth and formation of the Earth itself as a planet took place at the same time[81].

The terrestrial conditions which in many physical and chemical aspects were suitable for the prebiological evolution turned out to be unsuitable at least in one, very important respect: the length of the period of time indispensable for the course of this phase of evolution[82]. None of the above-mentioned conceptions can avoid this difficulty because they all presumed the possibility of origin of life only in the terrestrial conditions. But have the other solutions been taken into consideration as up to now?

Certainly, in the last twenty five years or so quite intensive discussions concerning the problem of possible connections between chemical composition

[81] G.V. Vojtkevich, Vozniknovienije i razvitije zhyzni na Zemle, Moskva 1988, p. 32.

[82] M.A. Line, The enigma of the origin of life and its timing, “Microbiology” 2002, v. 148 (1), p. 21-27.

of the comets and the origins of life were carried out. In the beginning of the eighties the works published by A. Delsemme, A. Lazcano and J. Oró, J.M. Greenberg and others contained the suggestions that organic compounds from the comets could be one of the sources of the substances indispensable to the genesis of life on Earth. It was, however, only presumption, because at that time no direct evidences of cometary chemical evolution was available; it was also difficult to estimate how this evolution was advanced. As a side note it can be admitted that at the same time F. Hoyle and Ch. Wickramasinghe tried to restitute in a range of books and papers the old idea of panspermia. However, these works were treated by other authors as groundless speculations. The idea that already formed living beings were imported to the Earth is one question and another question is the presence in the interstellar space of the molecules of organic compounds[83]. The last question can be solved on the scientific way.

6. Bilinear scenario of biogenesis (plus ultra!)

And indeed, the next years brought some direct evidence that the process of chemical evolution in the molecules of cosmic dust contained in the nuclei of comets reached already quite advanced stage. On the board of the Vega 1 spacecraft which was sent (within the framework of international research program) to meet the Halley comet, a mass spectrometer was installed for analyzing the dust particles contained in the comet. Basing on the data obtained in this study, F.R. Krueger and J. Kissel concluded that in the particles of the cometary dust are present many compounds of carbon with nitrogen and oxygen, abundant in the multiple bonds and highly reactive with water[84]. On the other hand, the inorganic fraction of cometary dust contains the catalysts suitable for creating from the above-mentioned organic substances in connection with water all the required precursors of the molecules of proteins and nucleic acids. Moreover, the dust particles, due to their

[83] Recent review: O. Botta, J.L. Bada, Extaterrestrial organic compounds in meteorites, "Surveys in Geophysics" 2002, v. 23, p. 411-467; J. Oró, Cometary molecules and life's origin, in: J.Chela-Flores, T. Owen, F. Raulin (eds.), First steps of the origin of life in the Universe, Dordrecht 2001 Kluwer, p. 113-120.

[84] Data confirmed later in the investigations of other comets, J. Kissel, F.R. Krueger, J. Sillén, B.C. Clark, The cometary and interstellar dust analyzer at the comet 81P/Wild 2, "Science" 2004, v. 304, p. 1774-1776.

porosity, create the natural compartments for the evolving molecules of organic substances, replacing in this way the protocellular membrane.

Now let us try to place these data in the context of cosmic history of the biogenic elements and compounds. There is a very substantial difference between the physical conditions of the evolution of organic compounds in the comets (outside the planetary system) and on the Earth. In the first case both temperature and pressure are low (which excludes the existence of water in its liquid state). Different situation exists on the surface of our planet: on the border-line between water and primitive atmosphere at the temperature about 300 K and the pressure 1 atm there may occur the reactions anticipated in the classical scenario of Oparin-Haldane-Urey-Miller up to the formation of purine and pyrimidine bases and amino-acids.

Following the mythological tradition according to which all that is humid and hot is associated with fertility, let us call the planetary branch of biogenic compounds evolution the "female" line of chemical evolution. We probably remember the mental reservation to the possibility of the origin of complicated biomolecules carrying the genetic information in such conditions. Shortly speaking, parthenogenesis in this case is excluded by thermodynamical reasons. What is lacking in the planetary line of prebiological evolution is the molecule of proto-RNA relatively separated from the environment. Exactly this may be offered by the cometary – let us call it "male" – line of the prebiotic evolution[85].

A bilinear scenario of the origin of life[86] resulting from the combination of characteristics of both lines of chemical evolution, divergent from physical and complementary from biological point of view, is satisfactory when thermodynamics is concerned, whereas no other formerly presented monolinear conceptions could fulfill this requirement.

But the other attribute of this scenario seems to be more important because of the above-demonstrated (apparent) crisis situation in protobiology. According to the

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[85] „New results demonstrate, that organic compounds, which are components of the genetic code in modern biochemistry, were already present in the early solar system and may have played a key role in life's origin", Z. Martins et al., Extraterrestrial nucleobases in the Murchinson meteorite, "Earth and Planetary Science Letters" 2008, v. 270 (1/2), p. 130.

[86] F.R. Krueger & J. Kissel, Chemical thermodynamics of systemic self-organization towards life by nanostructured cosmic dust particles, in: A. Brack, Exo-/Astro-Biology. Proceedings of the First European Workshop, Nordwijk 2001 ESA, p. 43-48; J.M. Greenberg, Cosmic dust and our origins, "Surface Science" 2002, v. 500, p. 793-822.

bilinear theory, for the transition from simple organic substances to primitive cells very short time is required, which corresponds with the lately accumulated paleo-biochemical evidence in favor of the "geological eternity of life". And one thing more: this is the first conception of prebiological evolution referring to the direct empirical evidences. Probably we will never get any samples of the primary terrestrial atmosphere or of the primary ocean, nonetheless we do have the results of direct analysis of the inorganic and organic fractions of cometary dust.

In the introductory article in one of the issues of the quarterly "Origins of Life and Evolution of the Biosphere" its then editor-in-chief J.P. Ferris expressed this opinion: "I feel that the Halley comet is a good omen for the field of the origins of life". Ferris had in mind the scientific aspect of the research on biogenesis, but it seems that such prognosis can be applied also to its philosophical aspect. The bilinear scenario of the origin of life was based on the philosophical presumption according to which the order originates from the chaos during the sequent phases of breaking up the symmetry. So, assuming, this scenario, in accordance with the prognosis of Ferris, gains acceptance of scientists due to the above-shown advantages of scientific nature, then it may contribute to the gradual decline of the philosophical standpoint which outlasted till now even in the area of protobiology, that order does not arise from disorder because it would be in contradiction with the principle of the uniformity of nature.

7. The “OHUM paradigm” and “OHUM theory”

In order to make an attempt to reconstruct the paradigm of modern scientific research on biogenesis it would be necessary to state right away that the paradigm combines certain scientific findings and hypotheses with philosophical theses. The premises consisting the paradigm can be presented, although schematically and in a crude approximation, as follows (I do not settle the issue of the name itself which is derived from surnames of Oparin, Haldane, Urey and Miller; for the time being I will use it as a draft version):

- Scientific premises. 1. Atmosphere was different than that of today (non-oxygenic). 2. The idea of heterotrophy of the first living beings. 3. The most plausible (but not the only possible) environment was so-called Darwin’s ”warm little pond”. 4. The idea of the common origin of the living world from one or several simple forms. 5. Non-existence of life (otherwise the first living system "would be instantly

devoured”). 6. Cosmic scale of transformations (in space and time). 7. The major significance of solar energy (and not e.g. the Earth’s heat). 8. Active Earth’s crust [I will add right away that (non-mechanist) philosophy of antropocosmism served as a philosophical source of the last three premises, usually not mentioned in the specialist literature].

● Philosophical premises.

A. Ontological, or what lies behind the formula “life is a natural emergent property of matter”. 1. Holism: holistic interconnections among phenomena, nature understood as a whole (system) with interconnected and interacting parts. 2. Historism: reality is perceived as a process (contrary to mechanism which viewed matter as being in itself); multitude of factors and variability of transformation mechanisms. 3. Autodynamism: active nature of matter (substance as causa sui), the capacity to develop as a result of a clash of antagonistic forces and elements.

B. Gnoseological. 1. The purpose of science: among other things to provide the world-outlok (contrary to narrowly understood utility). 2. The expected result: a theory, not necessarily one. 3. The concept of science: undivided “natural history”. 4. The influence of philosophy on science is normal, philosophical theses form the foundation of scientific theory.

What is ‘worse’, the open approval of the last thesis in particular is not a disgrace. Especially frank in this respect was one of the co-founders of the paradigm, namely Haldane (contrary to ‘bourgeois hypocrisy’ noted by the historians of science). In his opinion it is always useful to a scientist to know the history of philosophy, including ancient and oriental one; it is even inevitable when trying to solve fundamental problems. Social, including view-of-the-world motivation of the undertaken research does not disgrace a scientist – it is not shame but honour.

Separate premises will be discussed below. For the time being let’s just say that the key role in the philosophical aspect of “OHUM paradigm” plays a thesis on autodynamism of matter, or in other words the thesis on the capacity for self-organization of matter.

In the last 60 years about 250 theories of biogenesis have been formulated based on this paradigm. However, this theoretical pluralism is not a source of delight for everyone. The positivists and scientific creationists unanimously agree that the problems of origin – even if they are, they should not be the subject of scientific

research and that there is *no one* theory of biogenesis or – there may be *one* but it is imperfect. This one theory would be "OHUM theory", or "the theory of chemical evolution"[87].

As we have seen in the first part, quite considerable reservations concerning the outlined in this way theory have been voiced. It is worth emphasizing once again, therefore, that "the theory of chemical evolution" (alias "OHUM theory") occurs in *the singular* only in textbooks (and rather school than university ones) whereas in scientific literature there is a number of such theories. At least some of them avoid difficulties noted above. At least in some of them the presence/absence of oxygen in a primordial atmosphere is not of the paramount importance. At least some of them can do without the assumption about a long-standing existence of primaeval soup; in more modern theories this classical postulate has been significantly modified or replaced with another, equivalent postulate. And finally - at least some of the theories are not limited to pure chance in their explanation of the processes of origin of order or biological information. The authors of many modern theories of biogenesis aim at establishing the regularities of this process.

Going back to the issue of philosophical consciousness of scientists (and the role of university philosophers in this field), we may however have the impression that there is something which hinders the presentation of the theoretical achievements in the field of protobiology and that "something" is deeply rooted in the basis of this science. It is rooted not enough deeply to prevent the conduct of empirical research in this field,

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[87] „In its mature form, this theory can be summarized as follows: (1) the earth, at the time when life began, had a reduced oxygen-free atmosphere, with methane, ammonia, hydrogen and water. (2) This atmosphere was exposed to various energy sources (…) which lead to the formation of organic compounds. (3) These compounds, in Haldane's words, 'must have accumulated until the primitive oceans reached the consistency of hot dilute soup'. (4) By further transformations, life developed in this soup. For now, we shall focus on the first three parts of the theory, since *they constitute the reigning paradigm* on the origin of life", R. Shapiro, Origins, op. cit., p. 111 [emphasis added – W.Ł.]. In my opinion, it is not true. The correct reconstruction of the core of "the reigning paradigm" has been given recently, e.g., by Ch. de Duve, Singularities. Landmarks on the pathways of life, Cambridge 2005 Cambridge University Press, p. 7, where he states: "even though serious doubts have been voiced about its [Miller's experiment] underlying assumptions" – he continues – "Miller's findings highlighted the possibility that the building blocks of life could have been the products of natural phenomena, mandated by local physic-chemical conditions".

however, it is perceptible in theoretical discourse. The attempts to relegate that "something" to unconsciousness may bring about seemingly surprising effects. In order to explain them it is necessary to remind the thesis, advanced in the beginning, according to which the introduction of the problem of life's origin into twentieth-century science was (triple) philosophical novelty and that – in particular – the thesis on autodynamism of matter, or in other words - on its capacity for self-organization – was the central ontological premise of "OHUM paradigm". The thesis is of fundamental importance for protobiology. A lack of awareness in this respect may cause even such an effect that the author who makes (certainly in good faith) an attempt to present the theoretical achievements in protobiology - offers its caricature instead. The other effect is a lack of a comprehensive historical monograph on scientific research on biogenesis in the 20th century; the history is replaced with stories.

Without identifying the real philosophical sources of the paradigm of research on biogenesis it is impossible to either set the date of its origin or – what is more important – to indicate what is essential in the paradigm, and what is not[88]. It is possible to find in one encyclopedia mutually contradictory assessments: on one page we may read about "widely accepted at the moment theory of the origin of life on Earth" published in 1936, on another page, however, it is possible to learn that although "many elements" of "OHUM hypothesis" put forward in the 1920s "are still up-to-date", "as a whole it has only historical significance". We will not learn, however, which elements precisely we should regard as up-to-date, and which not, meanwhile this is the key issue. Without understanding the nature of the breakthrough which was constituted by the formation of the study of life's origin, the attempt to present its achievements will end in failure.

8. Recognizing the philosophical foundations of the breakthrough

The identification of the ontological aspect of this breakthrough – that is accepting the "active" nature of matter, or its capacity for self-organization – turned out to be

[88] Common opinion among the scientists is as follows: "While many features [of the classical "Oparin-Haldane scenario] are untenable, they are still an important cornerstone", A. Negron-Mendoza, S. Ramon-Bernal, Chemical evolution in the early Earth, in: J. Chela-Flores, G.A. Lemarchand, J. Oró (eds.), Astrobiology. Origins from the big-bang to civilizations, Dordrecht 2000 Kluwer, p. 71-84.

relatively the easiest task. When it comes to this actual novelty, that is the thesis on autodynamism, among scientists fully aware of its paramount importance there is a German chemist, the author of philosophical works, Friedrich Cramer (former director of Max-Planck-Institute für experimentelle Medizin, Göttingen), who – stating briefly: „matter has the basic property of self-organization"[89] - adds that the capacity for self-organization cannot be separated from matter in the same manner as gravity cannot be separated from matter. In other work, Cramer develops this idea introducing the concept of "the evolutionary field", similar to "the gravitational field": "Es gibt ein Evolutionsfield in dem Materie sich organisiert. Selbstorganisation bzw. Evolutionsfelf ist nicht von Materie abtrennbar"[90]. Agnes Babloyant, a Belgian scientist and co-worker of Ilya Prigogine, writes directly about a "revolutionary character" of the breakthrough connected with abandoning the view of matter as an inert substance and accepting its capability for self-organization[91].

When it comes to epistemological novelty, it may be stated that the question about when (and by whom) it was recognized, named and popularized is at the same time a reverse side of the question about the beginnings of the study of biogenesis in its current form, or – in other words – the formulation of "OHUM paradigm". A serious dispute over the sole possibility of research on the genesis (not only of life) flared up in 1963 during the international conference organized by S.W. Fox in Wakulla Spring, FL. One of participants, Peter T. Mora was speaking about "epistemological barriers" inherent in our way of thinking about nature: "There are certain epistemological limitations inherent in our thinking in the physical sciences, acquired, I believe, because of the way science developed during the last three or four hundred years. For practical reasons, we developed a simplifying scientific approach in physics. We follow the dictate of Descartes"[92]. John D. Bernal responded, stating that these remarks address in fact fundamental issue: "Dr. Mohra has shown that the principles

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[89] F. Cramer, The entropic versus the antropic principle. On the self-organiation of life, in: F. Bertola, U. Curi (eds.), The antropic principle, Cambridge 1993 Cambridge University Press.

[90] F. Cramer, Chaos und Ordnung. Die komplexe Struktur des Lebendigen, Stuttgart 1989 Deutsche Verlags-Anstalt, p. 232.

[91] A. Babloyantz, Molecules, dynamics and life. An introduction to self-organization of matter, New York 1986 Wiley, ch. 10.6.

[92] P.T. Mohra, The folly of probability, in: S.W. Fox (ed.), The origins of prebiological systems and their molecular matrices. Proceedings of a conference conducted at Waculla Spring, Florida, New York 1965 Academic Press, p. 49.

of experimental science do not apply to discussions on the origin of life and indeed cannot apply in any problem of origin"[93].

Even on the account of this discussion itself the conference was of vital importance to the issue, although it is necessary to add that the conference was not the first meeting of this kind. The year 1957, when the first international conference on the origin of life was held, is usually regarded by historians[94] as breakthrough in the process of formation of protobiology as a scientific discipline. A bit earlier, however, that is in 1954, in the editorial of "New Biology" journal, preceding the articles devoted to the origin of life [by J.D. Bernal, N.W. Pirie, J.B.S. Haldane, J.W.S. Pringle], it is stated that currently exists a separate branch of knowledge dealing with the analysis of questions concerning the subject as well as with the provided explanations[95].

"The provided explanations" had in fact been a subject of analysis for a certain period of time - including "New Biology" where the important article of J.D. Bernal[96] was published (in which he responded to criticism[97] of his book "The physical basis of biology"). From today's perspective this article should be considered landmark as it provides in a simple and clear way (and in a remarkably concise form – several pages long) the realization of the essence of the breakthrough coming at that time, considering *all the three* aspects of the breakthrough. Moreover, from the perspective of today's disputes it will turn out that things appreciated by some people – namely the clarity of the paper and theoretical openness of its author – are regarded as disadvantages by others. But about this later.

For the time being let's state that we are not entirely alone in seeking the breakthrough in natural history in the middle of the 20th century. The authors of the joint publication "On the origin of life; hypotheses and theories"[98] write about the marked revival of interest in evolutionary theory and biogenesis which could be seen, according to them, in the early 50s in Western countries, especially in England, what can be proved (apart from the above-mentioned discussion in "New Biology" and

[93] Ibidem, p. 52.

[94] See footnote 2.

[95] "New Biology" 1954, no. 16, p. 9.

[96] Keep off the grass. A review of a review, "New Biology" 1952, no. 13, p. 120-126.

[97] N.W. Pirie, Vital blarney, "New Biology" 1952, no. 12, p. 106-112.

[98] S. Skowron (ed.), O powstaniu życia; hipotezy i teorie, Warszawa 1957 PWN.

"The Modern Quarterly") by the fact that the issue concerning the origin of life was addressed in a separate paper presented by J.W.S. Pringle at a biological conference held in Cambridge in 1952.

In my opinion this conference was of vital importance to the formation of the study of biogenesis, but for reasons much more important than the sole fact of presenting the paper on this subject. Very important was namely the discussion which concerned *philosophical bases of knowledge* in this field (knowledge available at that time and the one which had been still sought after). Certain ideas concerning this subject appeared in the Pringle's paper, e.g. the explicitly formulated thesis on "the history of matter" ("the idea of a continuous form-building process at work throughout the history of matter") and – also explicitly – formulated criteria of preference for hypothetical scenarios of genesis ("a scheme which necessitates a highly improbable event is intellectually less satisfying")[99].

However, Haldane's speech defending theoretical pluralism of the origin-of-life-studies was of paramount importance to philosophical consciousness of this field of research. Having uttered some critical remarks on Pringle's hypothesis, Haldane ensured him that he is equally sceptical about his own theory. In this context he uttered the words "Some of my own speculations on this topic have achieved the stamp of orthodoxy, in the Soviet Union, thanks to Oparin, and in United States, thanks to Horowitz"[100], the words repeatedly quoted to testify to Haldane's characteristic constructive scepticism and distrust towards any form of orthodoxy. Later commentators who noticed and valued Haldane's scepticism and self-mockery did not notice, however, the cognitive ideal formulated by Haldane, namely his statement that when it comes to the issue of genesis we should not expect – at least in the immediate future – the formulation of *one* theory which will overshadow all the remaining ones. In this respect – in contrast to the branches of science based on methodological patterns of classical physics – a *multitude* of competing theories should be regarded as something natural and desirable: "when we have as many theories to chose from about the origin of life as we have about the origin of planets, we shall be in a better position to chose one of them, or items from several". Actually, no matter how the theories differ from each other, they do not have to be mutually

[99] J.W.S. Pringle, The origin of life, in: Evolution VII (Symposia of the Society for Experimental Biology), Cambridge 1953, p. 3, 9.

[100] J.B.S. Haldane, Foreword, ibid., p. IX-XIX.

exclusive, therefore we will not be necessarily forced to choose some, eliminating the remaining ones. There is – as Haldane states – a more exciting possibility: "Recent works on bacteria and viruses shows that one one simple organism can incorporate and reproduce indefinitely constituents of another by processe which cannot be called sexual. It is therefore not inconceivable that two or more different sorts of life began independently, perhaps by Pringle's method and by Haldane-Oparin method, and that later organisms are derived from their concrescence". The idea of theoretical pluralism corresponds, than, to the very nature of examined phenomena.

Interestingly, it is difficult for many specialists in history or philosophy of science, even for those who put a lot of effort into familiarizing themselves with source literature, to identify the *circumstances* in which the paradigm of scientific research on biogenesis was formulated. The leading position among them is taken by Loren R. Graham (from MIT) who devoted a very long chapter to the issue of the origin of life in his book on the history of the relationship between philosophy and science in USSR[101]. The chapter was preceded with the motto which is worth quoting as it soon started to live its own life: "In the late twenties and early thirties the basic thinking was done which lead to the view that saw life as a natural and perhaps inevitable development from the nonliving physical world Future studies of the history of ideas are likely to note that this new view, which amounts to nothing less than a great revolution in man's philosophical outlook on his iown position in the natural world, was first developed by communists"[102]. After this statement names (of Oparin and Haldane) and dates (1924 and 1929) are being cited. However, as admits Graham himself, it is by no means a simple matter. In his opinion it is hard to detect in Oparin's 1924 work any sign of Marxism; it is in fact materialism but a mechanistic one. Graham, admittedly, follows through Oparin's philosophical evolution which aims at conscious acceptance and application of dialectical materialism, and assesses the result positively in every respect. Moreover, Graham is strongly and openly opposed to the opinions of these sovietologists (as D. Joravsky) who ascribe this evolution to "political pressure" or even to opportunism. However, at the same time he shares their view that Oparin's philosophical stance has changed: in the 1920s it was, in short, mechanicism, from 1930s onwards – dialectical materialism.

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[101] L.R. Graham, Science, philosophy, and human behavior in the Soviet Union, New York [2]1987 Columbia University Press [[1]1972] .

[102] C.H. Waddington, That's life, "New York Review of Books" 1968, February, p. 19.

John Farley, a Canadian biologist, the author of a classical now monograph on the history of spontaneous generation[103], assesses this issue in a similar way. Appreciating the paramount importance of Oparin's 1936 monograph to science and assessing positively the impact of materialist-dialectical philosophy on it, Farley entirely agrees with classifying written a decade earlier work of this author as pure reductionism. Therefore, he also tries to detect a fundamental change in views of the founder of the study of biogenesis at the end of the 1920s, the beginning of the 1930s (caused, in his opinion, by the influence of new books and different political atmosphere). Similar opinion is expressed by an American historian of science, Mark B. Adams[104].

In essence then, the shortest – but incorrect in my opinion – historians' answer to the question on the circumstances in which the paradigm of research on biogenesis was formulated looks as follows: (1) who was the main or only founder of the paradigm? - obviously Oparin, (2) when? – in the 1930s, under the influence of (3) the change in "ideological context". It is worth emphasizing one more time that it is the answer provided by the people who – firstly – the "effect" itself, that is the formulation of this new paradigm, assess in an extremely positive way (from the viewpoint of the progress of science), secondly – the influence of Marxism on this "final effect" regard as unquestionable (and also assess it in a positive way).

I regard connecting the genesis of "OHUM paradigm" with "political spirit" as generally incorrect, dating its beginnings to the 1930s – as unjust: to both Haldane[105] and Oparin. The incorrect identification of the ideological context in which his 1924 work was written – as well as ontological stance[106] adopted in this work - basically

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[103] J. Farley, The spontaneous generation controversy from Descartes to Oparin, Baltimore 1977 The John Hopkins University Press.

[104] M.B. Adams, Oparin, Alexandr Ivanovich, in: Dictionary of Scientific Biography, v. 18, New York 1990 Ch. Scribner's Sons, p. 695-700.

[105] What concerns Haldane's motivation, in the case of this and any other scientific enterprises, the right idea has been recently expressed by M.B. Adams, Haldane's visionary biology, "Journal of the History of Biology" 2000, v. 33, no. 3, p. 457-491.

[106] I provide more details in other place; here I would like to pay attention to the fact that a central chapter of Oparin's 1924 work, entitled „The world of the living and the world of the death" (as a matter of fact very long, occupying about 1/3 of the whole text) was intended to prove that inanimate matter is by no means "passive" and it is possible to find there (separately) all the features which (taken together) are regarded as characteristic of living

prevents from understanding the nature of the breakthrough made at that time in science in general.

Curiously enough, by the way, the person who identified the breakthrough probably in the most accurate way, namely J.D. Bernal, has been still quoted – also in recent years - on this occasion, but obviously without understanding. Maybe on the account of the fact that his famous statement (from 1948): "Even the formulation of this problem is beyond the reach of any one scientists", is quoted separately from philosophical commentary provided by Bernal – a bit later[107] and also far earlier[108]. I will add right away that on the account of such works – contributing to the study of biogenesis the component of (self)consciousness of the breakthrough made in science by the sole fact of addressing one (central actually) of "those damned problems of origin", the name of Bernal should be added to the name of "OHUM paradigm"[109].

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beings, such as: organization, excitability, capability to metabolism and reproduction. On the account of this part of the work – passed over by commentators, even by the most astute and well-meaning ones, e.g. quoted above Graham – it is not possible, in my opinion, to classify the expressed in the work stance as a mechanist one, however, it is very close to the philosophy of antropocosmism presented particularly by V.I. Vernadski. The possible influence of the last philosopher on the formulation of "OHUM paradigm" I mention somewhere else. Here I will just say briefly that published in 1922 book by Vernadski "Naczalo i vechnost' zhyzni" ["The origin and eternity of life"], intended against the very idea of biogenesis (and nevertheless valued by contemporary critics as „oczeń umnaya kniga", "a thougthful book") I regard – in the light of materials I gathered - as an important, even decisive stimulus in this respect. This year Oparin prepared a paper, published two years later. The comparison of both texts (as well as a range of events which happened a decade later) allows to assume that the latter was a critical (and constructive) response to the former and that it widely adopted and used the philosophical aspect of the former.

[107] Cf his paper in "New Biology" 1952, cited above.

[108] J.D. Bernal, Dialectical materialism and modern science, "Science and Society" 1937, v. 2, no. 1.

[109] "A resolute monist, Bernal saw the unity of science as grounded in the unity of the universe itself", H. Sheehan, Marxism and the philosophy of science. A critical history, v. I, The first hundred years, Atlantic Hills 1993 Humanities Press International, p. 313. Cf also: H. Sheehan, J.D. Bernal: philosophy, politics and the science of science, "Journal of Physics. Conference Series" 2007, v. 57, p. 29-39, where she defends (in front of the recent critiques)

Getting back to Bernal's description of such (perfect) scientist who would be able to face up to the issue of biogenesis, it looks as follows. In his opinion the sole fact of formulating the problem is beyond the capabilities of one scientist. Such a scientist would have to be a competent mathematician, physicist and experienced organic chemist at the same time. He would have to demonstrate an extensive knowledge of geology, geophysics and geochemistry and simultaneously have an expert knowledge of all biological sciences. Another authority in this field, Ponnamperuma, pondering over (in more recent past) the "unusual character" of this scientist who "opened the doors to research on the central problem of natural sciences", compiled a similar "list of qualifications", including – quite rightly - philosophy[110]. As a matter of fact this statement concerned Oparin but in my opinion we can equally well put here Haldane's name. Obviously, Oparin deserved his name to be mentioned but rather as *pars pro toto*: the representative of a wide circle of scientists[111] who together "consisted" what Haldane represented alone. Some reasons have already been mentioned. Let's add then one word about his excellent education ("Haldane was immensely cultivated"[112]), his graduation in philosophy and finally his command of a number of foreign languages and cultures – including ancient and oriental ones (by an account of his Indian students[113], the work „The unity and diversity of life" he intended to write in Sanskrit). All these factors had an influence on his concept of nature, his fascination

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"his vision of science as inextricably tied to philosophy and politics". In the same special issue of the journal, another author writes: "I believe that Bernal had a huge intellectual picture of the unverse as a coherent and connected whole, a unitary picture, in sharp contrast to many other scientists, A.L. Mackay, J.D. Bernal: his legacy to science and society, "Journal of Physcics. Conference Series" 2007, v. 57, p. 1-16.

[110] C. Ponnamperuma, The origin of life: from Oparin to the present, in: B.F. Poglazov et al. (eds.), Evolutionary chemistry and related areas of physicochemical biology. Dedicated to the memory of Academician A.I. Oparin, Moscow 1995 Bach Institute of Biochemistry, p. 14.

[111] See about them: E.N. Mirzojan, Razwitie sravnitelno-evolucyonnoi biokhimii v Rossii, Moscow 1984 Nauka, especially chapter entitled "Predstavlenia o proiskhozdenii zhyzni v otechestvennoi biokhimii (1859-1924 gg.), p. 239-248.

[112] R. Milner, The encyclopedia of evolution, New York 1990 Facts of File, p. 207-208.

[113] P.P. Majumder (ed.), J.B.S. Haldane: a tribute, Calcutta 1992 Indian Statistical Institute. The recollections included in this volume and other documents I could read in Hyderabad, where Haldane's archive and private books collection are stored, suggest his predilection to examine anomalies and peculiarities in nature.

with complexity[114] and variability[115] and on his monistic concept of Being which was probably taken from ancient Indian thought.

So, contrary to various legends, the research on the origin of life initiated in the 1920s was not based on "politics" but on philosophy. 1952 should be regarded as an important date in the history of twentieth-century evolutionism (spelled with a capital „E", that is covering not only the history of the living world but also the issue of biogenesis). Apart from the above-mentioned discussion during the conference in Cambridge and the article by Bernal which contribute to the research a large measure of philosophical consciousness – let's add the fact of reissuing the at that time American edition of the book by Oparin, with an introduction written by a translator[116] who precisely explained its ontological novelty and the article written by an American biologist Urless N. Lanham who emphasized its methodological inventiveness[117]. The following important date – three decades later – is a formulation of the theory of pre-biological self-organization of matter by Manfred Eigen[118].

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[114] Gould paid an attention to it: "Haldane purposedly included a plural in the title of his book – The causes of evolution (1932) – for he believed that nothing so encompassing could be unifactorial", S.J. Gould, The structure of evolutionary theory, Cambridge MA 2002 Harvard University Press, p. 515.

[115] Cf e.g. article presenting hypotheses about variability of basic physical parameters in time and their consequences for the possibility of existence of different forms of life both in the distant past (when chemical changes used to be less effective source of mechanical energy than today) and in the distant future: J.B.S. Haldane, Radioactivity and the origin of life in Milne's cosmology, "Nature" 1944, v. 153, p. 555.

[116] Sergius Morgulis, prof. of biochemistry, Univ. of Nebraska, Omaha.

[117] U.N. Lanham, Oparin's hypothesis and the evolution of nucleoproteins, "The American Naturalist" 19532, v. 86, no. 829, p. 213-218.

[118] M. Eigen, Selforganization of matter and the evolution of biological macromolecules, "Die Naturwissenschaften" 1971 (10), p. 465-523. Let us add, that soon after this milestone scientific contribution, unfortunately, followed written by Eigen reductionist interpretation of his theory: in the book entitled „Das Spiel", in the article „Leben" published in Meyers Enzyklopädisches Lexikon (Mannheim 1975, v. 14, p. 713-718) and finally in prestigious journal „Angewandte Chemie" (1981, no. 3, p. 221-229). This interpretation (and not the theory itself) was soon the (pseudoscientific) basis for developing a number of broad philosophical concepts of global evolution.

9. Concluding remarks

What makes protobiology perhaps more attractive from a philosophical point of view than even biology itself, is its deep internal tension, caused by the duality of its philosophical roots. Protobiology, namely, is born both from the spirit of the Hegelian and the Comte'an metaphysics. And in spite of several declarations by scientists (and by philosophers) that it is possible - and needed - to be free of metaphysics (especially of the former kind) we will end up with the conclusion that the question can be not how to reject one of them, but should instead be how to be conscious of both.

Only by keeping in mind such a double philosophical genealogy of the origins of life studies it is possible to avoid several paradoxes (order without order, information without information, etc.) commonly claimed to be inherent to all theories, except one's own, and to overcome some stereotypes (eg. on the crisis of the chemical evolution theory caused by the discovery of 'geological eternity of life').

Włodzimierz Ługowski
Institute of Philosophy and Sociology of the Polish Academy of Sciences
wlugowsk@ifispan.waw.pl

"The Field of Between"

A Principle to an Integrative Relationship between

Philosophy of Nature and Natural Science

Hisaki HASHI (Vienna/Austria)

1. The Field of Between: Its starting point in Physics from the viewpoint of Natural Philosophy

1.1. Phenomenon of the Microworld

The Field of Between, one of the terms of my system philosophy, conceived, discussed and published since 2006 has the following structure. [119]

Starting point: *observation of an experiment in quantum physics*

The flying light quanta are received by the detector, either as a light particle or as a light wave. The result, that is, which one of the two appears, cannot be defined in advance. It differs for each emission. [120]

It depends on the structure and method of detecting of the facilities used in experimental physics. Many physicists were in search of a definitive result: Can light quanta be determined as substantial particles or only as wave phenomena? Nowadays,

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[119] Hashi, "The Field of Between", in: Niznik, Hashi (Eds.), What is Truth? In Philosophy and in Different Scienific Disciplines, Vienna/Warsaw 2011: Polish Academy of Sciences. Hashi, "The Field of Between: A New Principle for Interdisciplinary Epistemology", in: *Global Journal of Human/Social Sciences*, vol. 15, issue 1, Part H, Massachusetts/USA, Surrey/UK, Indore/India 2015: Open Association of Research Society. Hashi, "Das Feld des `Zwischen´ - Zur sytem-externen Logik der Quantenphysik", in: Interdiszpkinäre Philosophie der Gegenwart, Frankfurt a.M. 2009/10.

[120] Pietschmann: Quantenmechanim verstehen, chap. 5.1., Berlin 2003: Springer. Pietschmann, "Versuch zur Entwicklung des Denkansatzes der Quantenphysik", in: Hashi, Gabriel (Eds.), Intellectus Universalis, Wien 2005. Treiman, The Odd of Quantums, 1999: Princeton University. Bohr, „Das Quantenreultat und die neue Entwicklung der Atomistik", in: Dir Kopenhagener Deutung der Quantentheorie, Heisenberg. Bohr (Eds.), Stuttgart 1963. Heisenberg, Quantentheorie und Philosophie, Stuttgart 1994: Reclam. Heisenberg, Physikalische Prinzipien der Quantentheorie, Stuttgart 1991: Hirzel – B-I Wssenschaftsverlag

it is calculated in operations of probability. Yet, the nature of the micro object as a particle or as a wave can only be interpreted with the support of the complementary theory of N. Bohr. [121] However, as a thinker in Interdisciplinary Philosophy, I propose to explain it by the following Natural Philosophical Principle: "*The Field of Between*". Regardless if the emitted light quantum is received by a detector as a particle or as a wave phenomenon, it results "the *Field of Between*", the time and space between the flying quantum and the receptor. [122] Translated in the terminology of natural science, it is an "Interaction" of the flying quantum and the material of the detector. Interpreted from the viewpoint of Natural Philosophy, this interaction is embedded in "the Field of Between", between the space-time of the light quantum and the space-time of the detector. [123]

1.2. The Field of between in the Phenomenon of the Mezzoworld

In regard on the mezzoworld (referring to phenomena of the lifeworld and to general human activities) this principle of "Between" is found in various phenomena. Let us remain in classical physics:

The light beams are emitted uninterruptedly from the sun to the earth. If we use a prism crossing a spreading light beam, the aggregate of light quanta is divided in the seven different color bands in accord to every different frequency of light. Someone may ask: From where do these seven different colors emerge, from the nature of light quanta, or from our artificial operation through the facility of experimental physics?

NISHIDA, the founder of the philosophy of Kyoto School, points to another logical consistency: The different seven colors have been hidden in the entity of nature.

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[121] Bohr, "Das Quantenpostulat und die neue Entwicklung der Atomistik", in: Bohr, Heisenberg (Eds.), *Die Kopenhageer Deutung der Quantentheorie*, Stuttgart 1963.

[122] In the discourse of Natural Philosophy, we would not use the term of "time-space" of physics, even if being and non-being in reality exists only in the interdependent component of [time-and-space].)

[123] Hashi, "Das Feld des `Zwischen´ - Zur *system-externen Logik* der Quantenphysik", in: Hashi (Ed.), Interdisziplinäre Philosophie der Gegenwart, Frankfurt a.M. 2009/10.

Through our act of employing a prism this hidden nature appears.[124] Based on my principle, I would state: The bands in 7 different colors appear through the transmission of a prism, which becomes possible in the Field of Between, in the space-time between the shooting light and the prism. [125]

1.3. The Field of Between in the Phenomenon of the Macroworld

The principle of "the *Field of Between*" can also be validated in the macrocosmic space, such as in the phenomenon of high tide and low tide. Let us explore this phenomenon based on the concept of "*The Field of Between*":

The gravitation of the earth and the gravitation of the moon are in an interaction. The side of the rotating globe facing the moon is "pulled" by the moon's gravitation. Also the centrifugal action on the surface of the earth is based on this phenomenon. The ocean on the surface facing the moon is "pulled" up; at the same time, the reverse side of the globe is also "pulled" up by the centrifugal action of the earth: *It results a high tide.* On the other areas of the globe that are not influenced by the effects of this interaction (between the gravitation of the moon and the globe) *it results a low tide*.[126] The whole process of the [*"up and down" of the water surface*] is explained in physics through the interaction of material things in physical reality. From my viewpoint of

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[124] Nishida, "The World of Physics" (物理の世界) Complete Works, vol. 11, chap. II, pp. 22, Tokyo 1965: Iwanami

[125] Representatives of speculative philosophy would suppose that they *were i*n the nature per se; the resulting 7 colors of the bands are the "empirical result through our artificial instruments". Philosophers of cognitive science would argue that it is not so. In their thought everything in nature would have to be examined by natural scientific thinking. If a certain reality in natural science is proved repeatedly, it becomes a verity of cognitive science. A pure ideal as the product of an idealist philosophy without empirical evidence in this way is generally omitted as an integrated part of such a science.

Considering the facts and data the bands in seven different numbers of frequency are the product of human rationality. Nature did not calculate itself. Given this opposing approaches the endless debate between thinkers in transcendental philosophy and in cognitive science is not surprising. It may lead to a dogmatic stagnation without consideration of opposing opinions.

[126] Hashi' "The Field of Between", in: Hashi (Ed.), Denkdisziplinen von Ost und West, Norhausen 2015: T. Bautz.

Natural Philosophy, the whole process is executed by the principle of "the *Field of Between*". The high tide and the low tide are "enabled" by the *Field of Between*, in the zone *between* [the space-time of the globe] and [the space-time of the moon]:

This concept of mine was inspired by the position of Hans-Dieter Klein in Vienna. He interprets the phenomena of high tide and low tide primarily through a pure natural philosophical concept, an application of Leibniz's Monadology: The moon is situated as a monad [M], the earth is bound to its own monad [E]. H.-D. Klein says, that the moon Monad M influences the earth through its gravitation, by which the Monad [M] "measures" the monad of [E], the earth.[127] "Measuring" in this context is based on the analogue of the measuring of micro objects in quantum physics: Through the instrument that is put into the surface of the preparation the condition of the measured object is changed. In the microworld it is well known as the Heisenberg *Uncertainty Principle*. The micro object is scattered by the falling light quanta from the measuring instrument: giving rise to an example of the "Compton Effect".

H.-D. Klein states: [128] From the viewpoint of Natural Philosophy, there are numerous analogue phenomena in the mezzoworld: By measuring hot water temperature, the instrument that is of lower temperature changes the measuring of the temperature of the hot water. Based on this analogy Klein interprets the macrocosmic phenomenon of the [high tide]: The *moon Monad* [M] is analogically a "*measuring one*" that *works effectively* through the *earth Monad* [E]: The earth monad [E] is "measured analogically by the moon Monad [M]". In my opinion, both Monads [M] and [E] are working in a [*mutual interdependency*].[129] In H.-D. Klein the totality of the universe is a system of uncountable systems, whereas each systematic unit has its own entity; that is, the "Monad" includes also an "entelechy of its own development". The earth and the moon, the earth and the sun, the earth and the other planets are living and working in a mutual relation of an interdependent influence: A grand spectrum of a monadic harmony.

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[127] H.-D. Klein, "Systentheorie und MOnadologie", in: System der Philosophie Bd. IV, Ergänzungen der Kritik der Vernunft, Frankfurt a.M. 2003: Peter Lang.

[128] See the note 9.

[129] This may remind us on the theory of Relation in Early Buddhism (for example the part of the aamnyutta nikāya, 56.11.) – the mutual emerging of one and another one, [A] and [non-A], in a relationship of Interdependence.

2. The Field of Between in Natural Philosophy and Interaction in Natural Science

[Natural Science] always "prepares" the phenomenon of nature to observe it and to operate with it. [Natural Philosophy], however, focuses on how humans encounter nature and on how they think about and treat a particular phenomenon and problem in nature. The genre of Natural philosophy and of Natural Science are thus distinct. Even if the topic is the same, its full contents are different in [Natural Philosophy] and [Natural Science]. "The *Field of Between*" stimulates and actualizes the interdisciplinary dialogue *between* them. *The Field of Between* works as the [Third Station] including sharp critical insights for the [*A and non-A*] yet accompanied by [compassion] to promote a meaningful dialogue culture between *both fields* ([*A and non-A*]). The principal goal of this [Third Station], "the *Field of Between*", is the [*mutual transmission*] between [*A and non-A*], an integrative result in a transdisciplinary dimension. It enriches both [*A and non-A*] and constructs the [Third Station], that is, its own original philosophy, step by step. [130]

The central focus of this interdisciplinary philosophy, is the continuous actualization of the productive "*Field of Between*" through our sharp thinking and our peaceful acting: We realize and *become* "the *Field of Between*" in philosophical and interdisciplinary scientific inter-action. The thinking one embodies this ideal of the [mutual transmission] and [productive creation] of one's own theses and systems in a constant renewal. We, the thinking and acting humans, develop our firm [station as thinking subject]: At the same time, our subject is the [object in confrontation and in constant renewal due to our continuous research]: Our [subject] reflects and treats [ourselves as an acting and dynamically changing human]: *An origin of reflections of philosophy.*

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[130] Hashi, "A Few Note to on the 'Field of Between7: The 'Field of Between' as a Core Concept of the Interdisciplinary Dialogue", in: Global Journal of Human-Social Sciences, vol. 15, issue 1, Massachusetts/USA, Surrey/UK 2015: Open Association of Research Society. Hashi, "Einige Bemerkungen zum „*Field of `Between´*": Das „*Feld des `Zwischen´*" als Leitidee zum interdisziplinären Dialog, in> Hashi. Denkdisziplinen von Ost und West, Nordhausen 2015: T. Bautz.

3. Manifestation of the Field of Between in Reality through Dialogues between Natural Philosophy and Natural Science

Natural Science always addresses a certain problem or a certain and special part embedded in the whole phenomenon of nature. If one achieves a new thesis based on a discovered new fact accompanied by the certainty resulting from a certain preparation, the purpose of Natural Science is fulfilled. Further reflection on the influences such a thesis may have on the phenomenon of human thinking and human society in general is outside the genre of Natural Science. Natural Science's competence and validity concerning the objective factual truth is grounded in scientifically verifiable facts. Its way of thinking is analytical. It precisely works through all details, but the relationship of the discovered data to human thought in life and society is not addressed. The latter is the genre of the Philosophy of Nature. It enables reflections and views of the whole phenomenon including human life, language, communication and society: Its special competence is in the treatment of the relationship between our thinking subject and the treated object. Its results are more synthetic than analytic.

In this distinction between Natural Philosophy and Natural Science it is easy to separate them categorically. [*A and non-A*] cannot be identified as the same thing. However, if our reasoning stops at this state, it results in a "Field of Isolation". If one thinks that we can relate both genres [*A*] and [*non-A*] it is a first step into towards interdisciplinarity. Some people treat "the *Field of Between*" as a zone to relativizing different positions, in which we can propose an average case by case. This is a way of interpretation that does not lead anywhere: Additionally, this kind of relativizing is a danger for scientific thinking. It tends to grasp neither [*A*] nor [*non-A*] fundamentally, and searches only for a simple average in the middle of positions, by which a lot of factors are neglected without further reflection: resulting in a Field of Isolation in a most unproductive way. Another way is to review both position, [*A*] and [*non-A*], with the purpose of relativizing. The relationality between [*A*] and [*non-A*] has various characteristics. It also includes a differentiation and separation based on a certain reason. If one consciously ignores the difficulties in distinguishing and separating [*A*] and [*non-A*], a relativism of trivial kind results: It corresponds to a Field of (an unproductive) Relativism. "The *Field of Isolation*" and "the *Field of unproductive Relativism*" lack the following activity of human spirit in human consciousness: We,

the thinking subjects, enter into "the *Field of Between*", and place ourselves in the *time-space between* [*A*] and [*non-A*]. We act and practice within both positions dialectically, until we, the thinking human subjects, achieve our own position in transmitting [*A*] to [*non-A*]. We, as a bodily existence and spirit, are an autonomously thinking and acting system in a vivid life. "The *Field of Between*" works as the transmitter of seemingly irreconcilable opposites. [131]

4. The Field of Between – Recognized by humans as embodied beings

The Field of Between within quantum physics is a principle without complexity: Regardless if the emitted light quantum is received by a detector as a particle or as a wave, this action happens in the space-time of interaction of the flying quantum and the material of the detector. "The *Field of Between*" in the mezzoworld in classic physics is also not subject to any complexity: A prism that is hit by a light beam divides the light in 7 different colors according to the frequency of light. What takes place in both cases is an "Interaction of a physical thing in nature and a measuring instrument as a product of human thought".

Yet, if a human interaction takes place from person to person, it shows a higher level of complexity, because a human is a complex system that is constructed by various certain and uncertain factors that include body, psyche and mind. Each factor is changing dynamically without any interruption. And, factors of each level interdependently inter-act with factors of another level in a mutual exchange and relation.

Humans in the time of IT networking tend to think that everything can be reduced to compact information or to an aggregate within an analyzable systems. Such as an emitted light quantum that is received at almost at the same moment at the other side of the earth some people imagine that computer networking enables us to connect all

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[131] Hashi, "A Few Note to on the 'Field of Between7: The 'Field of Between' as a Core Concept of the Interdisciplinary Dialogue", in: Global Journal of Human-Social Sciences, vol. 15, issue 1, Massachusetts/USA, Surrey/UK 2015: Open Association of Research Society. Hashi, "Einige Bemerkungen zum *„Field of `Between´"*: Das *„Feld des `Zwischen´"* als Leitidee zum interdisziplinären Dialog, in> Hashi. Denkdisziplinen von Ost und West, Nordhausen 2015: T. Bautz

points of the earth. Rather, it connects all located points by two types that we call "*the Field of Isolation*" and "the *Field of relativizing*":

a) Information is not accepted: It is rejected by the receiver as "valueless or useless". Sender and receiver of the information are both "isolated".
b) Information is received easily, connecting one to another but *only at the surface;* linking to several further positions may follow, but without a fundamental reflection.

In regard on main streams in the contemporary world humans appear to be constantly and busily sending and receiving aggregates of information day by day, but only on the surface, resulting in a lot of complexity, misunderstanding and trouble between many stations of "information delivery" – i.e. computers or another IT technical media. This phenomenon is characterized by a twofold lack:

α) "The *Field of Between*" is ignored by digital networking.

β) A Human as a user of IT media is not a [dependent part of IT media]: Since many users of IT media tend to think and act as if they were a part of IT media, the phenomenon of humans in relationship to IT media results in confusion.

ad α) An interaction in "the *Field of Between*" from human to human has a potentiality to generate a new phenomenon. IT media instruments should be dependent on humans. They should not undermine the direct communication from human to human. An interaction between humans is not the same as an interaction between a particle and a measuring instrument; it is not the same as an interaction between a physical thing and an observing instrument.

ad β) An IT instrument operates only things that can be accommodated within its computer software. Contrarily, a human is a complex system that can only be treated and operated through the reflections of the autonomously thinking self. The complexity of such reflection shows that a human being judge in certain occasions while relating to many components that happen just at that time-space and are interrelated within a complex network. Even if nowadays computer engineering is highly developed, such as in protecting the user from cyber-attacks, the above mentioned complexity of us, the [handling and thinking humans as a *complexity* in ourselves], is less valued or even entirely ignored.

5. Human reflection as an actualizing of "the Field of Between"

In the experiment in physics, "the *Field of Between*" takes a place relating to the measured object and measuring instrument. In this case, the human being as the observer executes the thinking method of natural scientific rationality and logics of mathematics. From the perspective of Natural Philosophy the concept of "the *Field of Between*" can also be applied in various phenomena in a *vivid human life*. Such a dimension of critical thinking and relating to human beings enables a new reflection of computers and IT media. An interaction from human to human is of essential importance to the idea of "the *Field of Between*". However, "the *Field of Isolation*" and "the *Field of Relativizing*" mentioned above reduce or ignore all important factors that can emerge in a communicative interaction of humans. In these fields humans cannot *take part* in the "open court" of **"***the Field of Between*", because often they (consciously or unconsciously) are in a "reverse phenomenon", i.e. in dependence on IT media instruments. In this way humans are repressed by the types of communication IT media can offer. From occasion to occasion, with IT media or without IT media, humans can actualize the concept: *Let us become "the Field of Between" for ourselves*. The latter is a productive thinking and acting.

The thinking and acting individual has an orientation in the lifeworld as follows: He encounters an occasion in daily life, for example a new knowledge that is unknown in his area. He confronts himself with this occasion. Neither refusing the unknown thing dogmatically (in the type of "the *Field of Isolation*") nor easily relativizing it he tries to grasp it.

The human realizes a station that is positioned *between* his [previous knowledge] and the [new knowledge] that is not yet entirely clarified. He is a part of this "*Field of Between*". The human puts his own self into the middle between his position and the unknown new one. He compares "Between" several unknown components of the new phenomenon and the well-known components of his acquired knowledge. He reflects rationally on the unclear components. The answer always emerges within himself in a relational connection between his consciousness, the unknown components and things among the unknown phenomenon. If all unknown components are clarified, the Field of Between is fulfilled by successful interaction and communication between the well-known and unknown components. The thinking individual acquires new knowledge. The Field of Between becomes a *Field of Intra-Relation*. His previous knowledge and the new knowledge "melt" together in his body, consciousness and mind.

Delivering and receiving information is operated by a computer system exactly through its software program, and its networks: it is the operating system of media

instruments (also including Artificial Intelligence). However, the system of *The Field of Between* works by the *autonomously thinking and acting human*. A human as a complex aggregate of various systems can reflect and operate his/her own complexity, transmit his/her own self in a relationship to an occasion and a phenomenon in the environment, until the thinking human finally achieves a dimension of a new knowledge whereby the human experiences a full refreshing of his/her own self and a fulfilling new energy.

6. The Human Being as an embodying system of "the Field of Between"

The concept of the Field of Between is to be actualized by the bodily existence of humans. It can be manifested everywhere. The fundamental method to realizing can be constructed as follows:

The Starting point: the meeting of a human being and a new thing/new occasion/new knowledge/new situation

1) An autonomous negation to a "*Field of Isolation*": Subjective refusing and opposing something new in a dogmatic way must be examined cautiously and self-critically and be negated by the self-consciousness.

2) Also an examination and a negation of falling into a "*Field of an easy relativizing*" is noteworthy.

Because 1) and 2) are both in a state of a superficial focus, surveying only the surface, they must transcend their own limit.

3) The thinking self-consciousness positions itself into "the *Field of Between"*. Its method is Comparative Thinking. It compares the unknown parts of the new object with -knowledge that is already known.

4) The self compares similar components from the new knowledge and its acquired knowledge. It clarifies what is correct and acceptable.

5) If the thinking self questions the new component, it has to examine its own view dialectically: If it has a view of negation, the new component should be examined by the contrary aspect of affirmation. Vice versa, if the self has a positive affirmation to the new component, it must be examined from the viewpoint of negation.

6) The critically thinking human creates a [Third position] between [*A*] and [*non-A*]. We never make absolute or centralize our own position in an one-sided opinion: The [Third Station] is always developing with respect to critical and self-critical viewpoints to the [Station of cautious view] by which we strive to completing our position day by day.

7) In this way, the affirmative and negative aspects are balanced equally. If it is so, the self of cautious reflections executes a further step to a final gate: The affirmative and the negative aspects are not mixed up (!), but integrated within a new point of view, the synthetic wholeness.

The Field of Between is in the starting point and the key concept to understand a new thing, new phenomenon, or new knowledge. By the final step 7), the grasping of the new thing, the thinking and acting Self achieves a new dimension: The self becomes the Field of Between. The Self embodies the Field of Between and actualizes its significant contents.

Excursus: Misuse of "the *Field of Between*" in a human world

The *Field of Between* by a [natural scientific object] and a [measuring and observing human being] *can be hardly "misused"*, because the goal of natural scientific thinking is the exact measuring and observation that excludes, as much as possible, any subjectivity. In case of "the Field of *Between*" between a human being and another human being, a completely different dimension can be detected: The encounter of two absolutely different persons as completely different systems of perceiving and apperceiving. There emerges a *Field of complexity* whereby a human may be able to use his/her own *rationality for cunning*: a clever stratagem only for one's selfish ego. *The Field of Between* can also be misused in the following way:

A human is a selfish egoist that is thirsty to get only his/her own profit with the help of political might in an institution or in a group of society. The selfish ego is constantly active. It focuses exclusively on its own success by omitting others through political might. A *Field of Isolation* is realized by refusing various others that have had a productive idea or project commonly occurs through such a selfish ego. This ego tends to provoke, to omit and to destroy qualified others in a society. It considers this stratagem of cunning as "right and acknowledged": The field of the

consciousness of this human being is oriented to "filtering" information and accepting only data that are advantageous to his/her selfish ego. A typical misuse of the *Field of Between.* [132]

A certain possibility to overcome this situation is based on the following method: to execute, to realize and to actualize the concept of the *Field of Between* in every situation. A *Field of Between* that has been misused for a long time will be transformed to a "Field of permanent rejection". The others will leave and the misusing person will become the *Field of Isolation*. All others will show their behavior of their "*Fields of rejection*". In such a situation the network of human society can immediately devolve into a state of a constant decadency. A turning point can hardly be found, until the human society recognizes its own danger and orients itself autonomously to correct the decadency by repairing their life and social network into a well-organized relationship.

As previously explained, the phenomenon of [high tide] and [low tide] results from the [Field of Interaction] of the [gravitation between moon and earth] and the [gravitation of earth and the centrifugal action by its rotation]. H.-D. Klein interpreted this natural phenomenon in an analogy, that the "moon measures the earth (globe) whereas the surface of the earth is influenced by the gravitation of the moon as the "measuring instrument"". This phenomenon is caused in the natural order in a peaceful and dynamic harmony: The moon and the earth are *without any struggling* and *without any competition* in their states.[133] In regard on this macrocosmic order of nature, humans take part in the same phenomenon of nature.

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[132] Hashi, "A Few Note to on the 'Field of Between7: The 'Field of Between' as a Core Concept of the Interdisciplinary Dialogue", in: Global Journal of Human-Social Sciences, vol. 15, issue 1, Massachusetts/USA, Surrey/UK 2015: Open Association of Research Society. Hashi, "Einige Bemerkungen zum „*Field of `Between´*": Das „*Feld des `Zwischen´*" als Leitidee zum interdisziplinären Dialog, in> Hashi. Denkdisziplinen von Ost und West, Nordhausen 2015: T. Bautz.

[133] Hashi, "A Few Note to on the 'Field of Between7: The 'Field of Between' as a Core Concept of the Interdisciplinary Dialogue", in: Global Journal of Human-Social Sciences, vol. 15, issue 1, Massachusetts/USA, Surrey/UK 2015: Open Association of Research Society. Hashi, "Einige Bemerkungen zum „*Field of `Between´*": Das „*Feld des `Zwischen´*" als Leitidee zum

In case of a natural catastrophe humans cannot directly struggle against the mega-power of nature. Humans can only consider and actualize measures to reduce the extent of the natural catastrophe to a minimum – like a dam against a flood or a drought. In the case of a *tsunami* it is known that also dams in their present structure are not able to provide sufficient protection.

7. Conclusion – The Field of Between as a productive Method in thinking and acting

Let us summarize what the principle of *The Field of Between* can contribute in our contemporary world:

1) In regard on *Natural Science*: The *Field of Between* works as a [mediating Field] that enables a natural scientific inter-action.

2) In regard on *Natural Philosophy*: The *Field of Between* gives us a number of stimulations whereby a fundamental thinking of humans can be influenced and exchanged in a productive way to execute and realize a certain thing in the phenomenon of reality.

3) In regard on the *Interdisciplinary Dialogue* between [Natural Philosophy] and [Natural Science]: It works as a [Transactional Principle] to actualize a [mutual transmission]

4) In regard on a *System of Philosophy*: It works as the [Third Station] between different scientific disciplines ([*A and non-A*]). Based on a flexible and dynamic transmission between one's own and another system, it is able to construct a new system of philosophy, step by step.

5) In regard on *Philosophical Anthropology*: It works as a dynamic and fresh principle for a vivid life of humans. IT media are linked and networked all over the world, whereas the users (humans) are often isolated unconsciously in a virtual world of a selfish ego. The *Field of Between* stimulates humans for a real and productive networking mediated by [real humanity]. In this way a well-balanced relationship between humans as the users and masters, and IT media instruments can be achieved.

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interdisziplinären Dialog, in> Hashi. Denkdisziplinen von Ost und West, Nordhausen 2015: T. Bautz

Hisaki Hashi
Dr. phil., Univ.-Doz. (Dr. habil.),
Professor at the Department of Philosophy, University of Vienna
Head of the Board, Verein für Komparative Philosophie und Interdiszilinäre Bildung,
KoPhil in Vienna
hisaki.hashi@univie.ac.at

Biological Neo-Teleologism from an Aristotelian and Whiteheadian Perspective

Spyridon KOUTROUFINIS (Berlin / Germany)

1. On Different Approaches to Teleology in the Philosophy of Biology

In the first half of the 20th century the attempt was made to banish all teleological thinking from biology. In the last few decades, however, several biologists and philosophers of biology have claimed that organisms may be considered teleological entities, spurring a movement that is often celebrated as the renaissance of teleological thinking and that could be called 'neo-teleologism.'[134] Though neo-teleological explanations often treat natural selection as sufficient to explain teleology, I will apply the term in a broader sense that includes three different approaches introduced in succession since the 1940's.[135] However, the issue of teleology in contemporary biology is a very contentious and complicated subject. It is doubtful whether opponents are arguing over the same thing.[136]

Aristotle is the thinker most often cited by philosophers of biology. The interpretation, and subsequent acceptance or rejection of Aristotle's treatment of teleology is a reliable landmark for recognizing the metaphysical foundation of different authors' understandings of teleology. Philosophers of biology tend to reject all forms of universal teleology or pan-teleology, the Aristotelian, Platonic, or Leibnizian consideration of the cosmos as a finally aligned totality.[6] Neo-teleologism is confined to a specific biological variety of teleological reasoning—the 'special'[7] or 'regional'[8] teleology which merely refers to single living bodies and not to global phenomena like the evolution of species or of the cosmos. Special teleology can also be subdivided into 'inner' and 'external' teleology, the former focused on the growth

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134 Millikan 1984, Neander 1991, Griffiths 1993, Kitcher 1993, Godfrey-Smith 1994, Allen & Beckoff 1995.

135 Cummins 2002, 162.

136 Costa 2008, 183-188.

of the entire organism, its elements, and their functional role, and the latter ascribing "utility for something else"[137] to the organism as a whole. Philosophy of biology recognizes only special, inner teleology.

In the long history of philosophy of organism, a great deal of attention has been paid to special inner teleology, however, without considering it to be the only kind of natural teleology. In occidental philosophy of organism, for more than two millennia, the term '*telos*' kept its double meaning of both 'end,' or rather 'final-state,' on the one hand, and 'purpose,' 'aim,' or 'goal' on the other.

In neo-teleological approaches to the philosophy of biology, the concept of *telos* is understood exclusively as final-state-directedness of a material process that has been achieved by blind, deterministic, non-mental factors alone. Growth, embryogenesis, physiological processes, the search for food, achieving a certain geographic position (e.g., in the case of migratory birds) and final acts of behavior (e.g., in the case of mating) are considered to be typical examples of final-state-directed processes.[138]

Researchers in neo-teleology carry forward an impression of Aristotelian telos as both final state and purpose. This impression is a major source of confusion in contemporary debates. The relevant literature is teeming with expressions like 'purpose,' 'aim,' and 'goal,' and less frequently, 'purposiveness.' Sorting out the confusion requires careful examination of the meaning of the terms 'purpose' and 'aim' in neo-teleology, an issue that leads us to three milestones in the twentieth century neo-teleology renaissance.

1.1. Cybernetics

First, in 1943, the founders of cybernetics—Wiener, Rosenbleuth, and Bigellow—published the article "Behavior, Purpose and Teleology," in which they argued for the rehabilitation of teleology. They used the term 'purposeful' to denote an act where "the act or behavior may be interpreted as directed to the attainment of a goal, namely, to a final condition in which the behaving object reaches a definite correlation in time or in space with respect to another object or event."[139] In this definition, the term

[137] Toepfer 2005, 36.

[138] Mayr 1991, 61.

[139] Rosenblueth, Wiener, Bigelow 1943, 18.

'purpose' is coextensive with a special understanding of the expression 'final condition,' which in this context means 'final-state.' In cybernetics, the term 'aim' means 'final-state,' that is, the encounter between a behaving object (e.g., a missile) with a certain external object (e.g., a ship)—and this is merely a spatiotemporal event. On the basis of this concept of purpose that excludes every conceivable kind of first-person perspective—the behaving object does not have an *aim of its own*, as Hans Jonas correctly states[140]—cyberneticists define teleologic behavior as the variety of purposeful behavior which reaches a final-state by means of a mechanism of *negative* feedback:

> "We have restricted the connotation of teleological behavior by applying this designation only to purposeful reactions which are controlled by the error of the reaction—i.e., by the difference between the state of the behaving object at any time and the final state interpreted as the purpose. *Teleological behavior thus becomes synonymous with behavior controlled by negative feedback,* and gains therefore in precision by a sufficiently restricted connotation." (Rosenblueth et al. 1943, 23-24, italics added.)[141]

There is an intrinsic relation between this understanding of teleology and the cybernetic concept of *information*: Wiener thinks of information as something employed by a "behaving object" that is controlled by negative feedback that steers it towards a predefined goal. Wiener developed his concept of information almost contemporaneously with Claude Shannon in the 1940s. Both authors employ the same formalism and connect the notion of information with the concept of statistical entropy which is a measure of a physical system's disorder.[142] By doing so they identify information with the physical features of a material or energetic system (e.g. an electromagnetic signal) thus ignoring meaning and reference of the message that this system potentially caries. The operations of cybernetic and information processing devices do not have meaning and value for the automata themselves, but only for human beings who determine the 'goals' and 'purposes' of the devices.

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[140] Jonas 1997, 202.

[141] Rosenblueth, Wiener, Bigelow 1943, 23-24.

[142] Wiener 1961, 62, 11.

Therefore, both renderings of the term 'information' have only a syntactic aspect and thus void of semantics (meaning and reference): although a missile can process the electromagnetic signal of its radar in such a way that enables it to encounter a ship, the signal is void of meaning for the missile itself and so does the telos or purpose that it attains by processing the information of this signal. In cybernetics (Wiener) and information-theory (Shannon) teleology encompasses a concept of information that is not able to count for the semantic aspects which underlie the design of cybernetic and information processing automata. These theories do not make any claims about the causality of the processes involved in creating, expecting, or evaluating the usefulness of information.

1.2. Neo-Darwinism

Second, some neo-Darwinists welcomed the non-metaphysical conception of purpose and telos that was provided by the cyberneticists. They adopted and developed cybernetic teleology further. The well-known biologist Ernst Mayr added that the mechanisms which orientate the negative feedbacks towards a final-state and activate them are programs. Mayr, Jakob, and Monod are the best-known proponents of the program metaphor in biology.[143] They consider programs as genetic or behavioral algorithms that were generated in evolution and brought *selective advantages* to the organisms carrying them out. Normally, *neo-Darwinist theoreticians of teleology interpret purpose as function*. They do not attempt to explain, for example, how the wing of a bird embryo develops step by step by molecular mechanisms, but rather content themselves with stating that wings develop in order to perform a function, leading to a positive selection of all its bearers which were progenitors of the bird embryo in question.[144] The "what for" questions and the "in order to" replies typical of teleological language were retained. They refer, however, only to natural selection:

> "The sense in which what-for questions and their answers are teleological can now be clarified. Put cryptically, we explain A's existence in terms of A's function. More fully, A's existence is explained in terms of effects of past

[143] Mayr 1991, 61; Jakob 1993, 1-17; Monod 1971.

[144] Ariew 2007, 179; Mayr 1991, 75, 61.

instances of A; but not just any effects: we cite only those effects relevant to the adaptedness of possessors of A."[145]

Griffith described this kind of neo-Darwinist teleological reasoning as follows: "where there is [natural] selection there is teleology."[146] The neo-Darwinist idea of the genetic program or genetic information is based on the concept of information as it is introduced in cybernetics and information theory; in part, this makes it difficult to ascribe semantic aspects to this idea. Nevertheless this should be possible, since survival, reproduction, or death cannot be conceived of, without any reference to their meaning and value for the organisms, in question, themselves.

1.3. Theory of Self-Organization

Third, despite the problematic conception of a 'program,' the lack of even a simple concept of organism remains a decisive weakness of neo-Darwinism. Neo-Darwinistic teleologism only considers single functions. But in evolution a whole phenotype is selected, that is, a complex structure of mutually conditioning functions and elements. Two hundred years ago, Immanuel Kant emphasized this most essential aspect of the organism with his concept of the 'self-organizing being.'[147] Because of the inability of neo-Darwinism to consider whole organisms, an organismic turn is currently taking place in the philosophy of biology in which dynamic systems theory (or the theory of self-organization) plays an essential role. The directedness of growth and other processes towards a certain final-state or an 'aim,' as it is often called, is understood as the outcome of the *self-organized* complex molecular dynamics of organisms. The proponents of this conception consider the organism as a self-organized dynamical physico-chemical system, the dynamics of which results in virtue of an extremely complex structure of interdependent positive and negative feedbacks.[148] Dynamic systems theory and theories of self-organization build the

[145] Brandon 1990, 188.

[146] Quoted by Toepfer 2005, 42 (my translation).

[147] *Critique of Judgment*, §65

[148] Christensen 1996, 308f; Rosen 1985, 173f.; Goodwin 1989, 49-61.

theoretical foundation of the third and most recent kind of biological neo-teleologism. From this perspective, the non-linear deterministic interactions between the organism's molecules constrain their own dynamics and thus give rise to a deterministic material phenomenon that is directed to a certain final state. Theorists of self-organized physicochemical systems illustrate the dynamics of biological and organismic processes, such as metabolism and growth, by using an abstract space called a 'state space.' The course of the process is represented by a curve called a 'trajectory.' The dimensions of the state space represent the different sorts of molecules out of which the organism is made. Thus each one of the points on a trajectory through the state space provides a complete qualitative and quantitative description of the material composition that is physically present as the organism at a particular point in time.

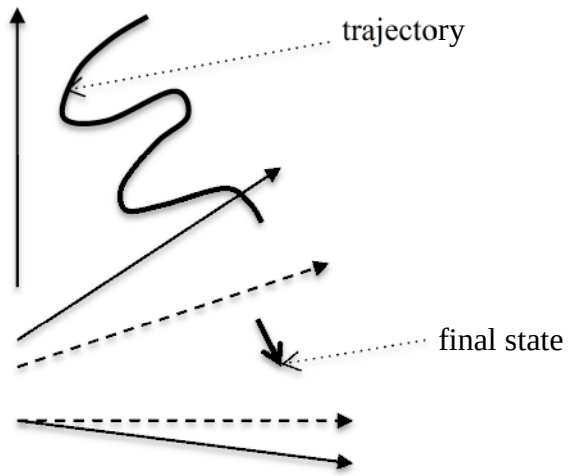
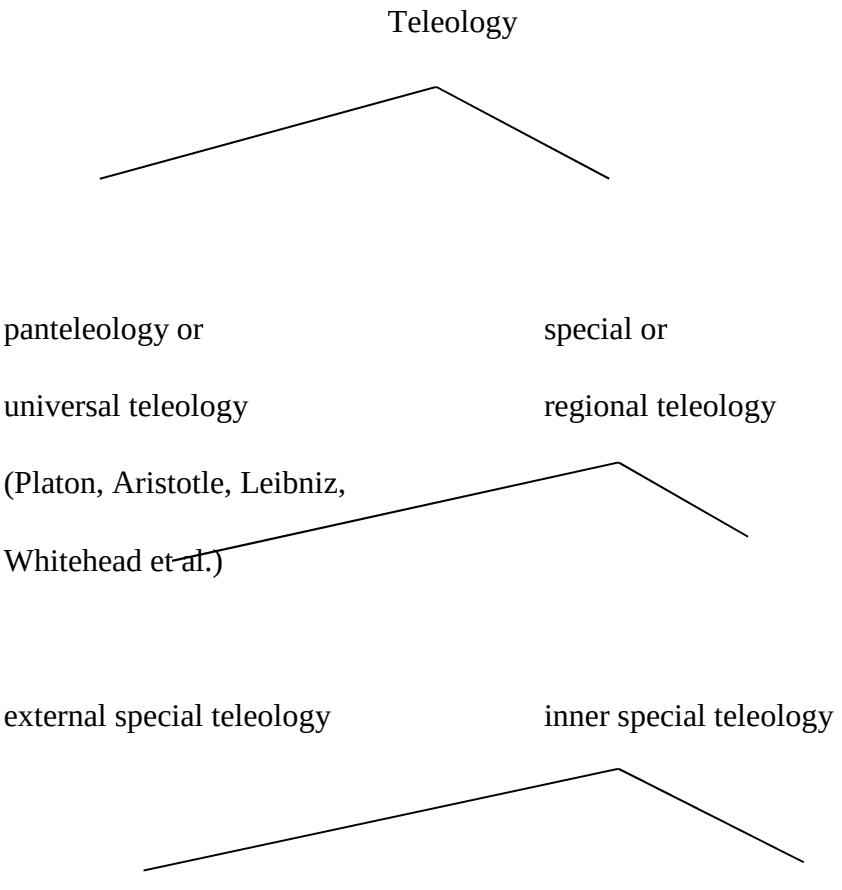


Fig. 1: The trajectory of a biological process in a state space.

Thus, the trajectory represents the succession of the states that the organism occupies in different points in time. In the theory of self-organization, the dynamics of a growth process is considered to be entirely determined by the material constellation of both the growing organism and the part of its environment with which the organism interacts. The final state of growth is reduced to what is physically present inside the organism as well as around it in the relevant part of its environment. In a nutshell: The final state of a biological process, is considered to be entirely reducible to something physically present, the material constellation of the organism and its environment.

Philosophy of biology gives all three neo-teleological approaches great credit for providing interpretations of the concepts of ‘purpose,’ ‘aim,’ and ‘telos’ without any reference to mental factors. Philosophers of biology differentiate sharply between versions of special internal teleology divested of all psychological or mental connotations and others which assume mental factors. According to philosophers of biology, only *non-mental special internal teleology* comes into question for biology, thereby distancing themselves from many philosophers, including Aristotle, as the Figure 2 shows. All three approaches serve the development of a new form of teleologism, allowing biology to use teleological language without neglecting contemporary scientific metaphysics which remains essentially materialistic. The common denominator of all three neo-teleological approaches is that *they consider the final state of a process, to be determined by something physically present: negative feedback, genetic program, self-organized material structure*.



inner special teleology	inner special teleology
(Philosophers of Biology)	(Aristotle, Leibniz, Whitehead et al.)

Figure 2: Different kinds of teleology. This diagram is mainly based on ideas of Toepfer and Mahner and Bunge.[149]

2. Teleology in the works of Aristotle

The philosopher and scientist Mark Bedau rightly noted that "we are unsure whether teleological notions apply in roughly the same cases as those in which we are unsure whether value notions apply."[150] This statement relating teleology with value is fully applicable to Aristotelian and Kantian considerations of organismic teleology.

The second book of the *Physics* occupies a crucial position in Aristotle's theory of biological teleology that, from a present-day perspective, can be assigned to inner special teleology. In this text, Aristotle makes clear that the concepts 'final state' and 'purpose'—the Greek expression for 'purpose' is '*ou heneka*' (οὗ ἕνεκα) which means 'for the sake of which'—are mutually related and inseparable. The key query, however, is whether the Aristotelian term 'purpose' refers to an experiencing unity that strives to attain its aims. Neo-teleologically-minded biologists and philosophers tend strongly to interpret the Aristotelian concept of purpose in a functionalist manner[151] by overestimating the importance of certain passages in the second book of the *Physics* wherein Aristotle explains the final-state-directedness of certain biologic processes by their functions in the organism: "roots extend downwards […] for the sake of nourishment"[152] and "sharp teeth are located in the front of the mouth for the

[149] Toepfer 2004, 36f; Mahner & Bunge 2000, 348.

[150] Bedau 1998, 272-273.

[151] Ariew 2007, 173.

[152] II, 8, 199 a28-29.

sake of tearing."[153] Appropriately, Hans Jonas criticized this myopic restriction of Aristotle's thinking to functionality by reminding us that his teleology is only "in the second place a fact of structure or physical organization, as exemplified in the relation of organic parts to the whole and in the functional fitness of organism generally."[154] Indeed, something beyond neo-Darwinian functionalism is much more important to Aristotle's teleology: his worldview simply *forbids* considering a natural process controlled by blind, i.e., non-mental forces, as being able to achieve the kind of ordered result attained by an appropriately formed organic structure that serves the purpose of staying alive, like an organism or an organ, rather than degenerating into chaotic malformation.[155] Aristotle applies to blind mechanistic processes the term 'automaton' (αὐτόματον), which may be translated as 'senseless in itself,' since 'maten' (μάτην) means 'in vain.'[156] He refers to all processes that are not grounded in any kind of mental purpose as 'automata.' Therefore, he would subsume all processes which we today consider to be regulated only by physico-chemical interactions under the category of 'automaton.' Accordingly, from his point of view, all phenomena of material self-organization constituting the third type of contemporary neo-teleologism would be cases of 'automatic' becoming. Automatic processes may sometimes look *as if* there were a purpose behind their movement: the roof tile that falls on somebody's head could have been thrown at him purposefully by someone else. From Aristotle's anti-mechanistic perspective only very rarely do blind forces lead to a final-state that could be considered a purposefully generated one. In contrast to modern physics, Aristotle thinks that most cases automatic processes lead to chaotically disorganized final states. He would never assume that the non-mental processes of self-organization would be able to produce something as ordered as even a single cell.

In Aristotelian hylomorphism, the final-state of living processes is something both aimed at and purposed. As Hans Jonas has shown, Aristotle made a distinction between the "mere ending and internal 'end' of a movement."[157] As stated above this does not mean that Aristotle ascribes a human- or animal-like mentality to biological processes. In the first clearly formulated theory of teleology, as presented in the works

[153] II, 8, 198 b24-25.

[154] Jonas 1997, 163 (my translation).

[155] *Physics* II, 8, 198 b33-199 a28.

[156] *Physics* II, 6, 197 b22-31.

[157] Jonas 1997, 203 (my translation).

Physics and *On the Soul*, the concepts of 'aim' or 'goal,' 'end' and 'purpose' denote inseparable aspects of one and the same thing: they designate essential elements of the '*eidos*' (εἶδος), or the form or the biological species to which a single living being belongs. In Aristotelian metaphysics 'eidos' is considered to be formal causality that is a non-material causal factor. In his seminal work *De Anima* (*On the Soul*) Aristotle says both that all processes occurring in a living being are determined by its *soul* (psyche) and that the soul is the 'eidos' or the formal cause of a "natural body having in it the capacity of life" (II, 1, 412 a 19-21). By 'life' Aristotle means the power of self-nourishment, independent growth and decay" (ibid. a 14-15). Accordingly, the growth of an organism is not determined by its material constitution but by its soul, particularly by the part of its soul that Aristotle calls the 'vegetative soul' (threptikon) (III, 11, 434 a 22-25). As Aristotle says in *Physics*, the formal cause of a being is intrinsically connected with its efficient and final causes (II, 7, 198 a 24-27). It is the eidos or vegetative soul of a growing organism that directs growth towards a particular final state. In other words, in Aristotle's biology the agent of growth (and nourishment), the *vegetative soul*, is not reducible to something physically present such as the material constellation of the growing organism. Thus, in sharp contrast to contemporary materialistic neo-teleologism, *the most essential feature of Aristotelian teleology is that teleological becoming is determined by a causal factor that is not reducible to what is physically present*.

3. Aristotle's Teleology from a Whiteheadian Perspective

Against the background of the last great metaphysical systems—created in the early 20th century by W. James, C. S. Peirce, A. N. Whitehead, H. Bergson, et al.—Aristotle's understanding of vegetative soul may be interpreted in terms of *proto-mental* or *proto-experiencing* agency. According Whitehead's panexperientialistic metaphysics entities at all levels of complexity are able to enjoy some degree of subjective experience. This is often misunderstood since we usually ascribe experience only to conscious beings. But, as Whitehead says, "consciousness presupposes experience, and not experience consciousness"[158] (and by 'consciousness'

[158] Whitehead 1978, 53.

he means human and animal consciousness). In other words, not all experience is conscious. Under 'consciousness' he means human and animal consciousness. Whitehead's explanations harmonize well with an important position in Aristotle's *Physics* which clearly argues that a purposefully acting entity is only rarely conscious of its acting. He states, "it is absurd to suppose that purpose is not present because we do not observe the agent deliberating. Art does not deliberate. If the ship-building art were in the wood, it would produce the same results by nature. If, therefore, purpose is present in art, it I s present also in nature" (II, 8, 199 b26-30). Of course, in all arts purpose is present because the agent acts towards an aim. In other words, conscious action is only a seldom special case of purposeful end-directed action. This interpretation of Aristotle's understanding of teleology confirms Thomas Nagel's and Mark Bedau's position that one may talk of teleology only in connection with entities to which one can ascribe *values*, since an experiencing being is only directed towards something if that something is experienced as something valuable.[159]

If, as I suggest, Aristotle's understanding of the soul's agency be re-interpreted in panexperientialistic terms of Whitehead's process philosophy, his concept of 'telos' may be extended to include the idea that achieving a certain final state requires that an experiencing being, even a proto-mental one, *desires* to achieve this final state. In other words, the final state has an intrinsic value that is experienced by an acting being, such as the vegetative soul.

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[159] Nagel 2012, 97; Bedau 1998, 272-273.

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Sprydon Koutroufinis
Dr. phil., Dr. habil.
Technische Universiät Berlin
spyridon1967@gmail.com

“No –Thing” (*Nothingness*) should be More than You can Imagine
– Looking at „*no Thing*“ from a Systemic Point of View

(Theory of Cognition / Epistemology)

Walter KARBAN (Vienna / Austria)

, wk@inmotion.at

Systems Theory deals with the ability of observing and describing recurring events (patterns)
and thus deduce certain principles concerning interacting groups of elements (called systems)
and their respective environment.
Thinking in systems needs an observer, who describes what he calls an observable system to
tell another observer about his observation. Complexity is reduced with this observation and
apparently chaotic situations can be described.

From this point of view two essential questions arise:

a. the intention of the observation

Every observer at least is a human beeing, even if the respective pattern recognition will be achieved by computers or other technical tools nowadays. The rules and at the end laws derived from this observations shall prove the ability to predict the future development of the enviroment of men. This way what we call philosophy of science tries to combine truth of reason and truth of fact.

b. the way this observation is made

Every observation needs a sequence of distinctions, made by the observer, to defne patterns and this way get a description of a system. You might call this sequence of distinctions cognition and you might call this observed system a „Thing“. This thing is embedded in a world named environment. Looking at the oberserver, a possible second order observer is able to recognize some kind of restricted ability to make observations, depending on the system(s) the respective observer is embedded in.

Assuming, that „No – Thing (nothing)“ is defined (yet), there should be what we may call the whole (environment) with the possibility to define more things than we can imagine (because imagination is restricted to an observer, who likewise is limited).

Human Observations

In short, the intention of human observations may be able to explain the surrounding world – trying to remain in some kind of stable balance in future and this way to survive.

Taking a closer look, how this observations are made, leads to the fact, that an observer of the observer is needed. This second order observer (Heinz v. Foerster) is able to see the circumstances (the environment) the first observer is related to or even depending on.
In system theory the observer determines a system on his/her own specific, autopoetic and self-referential reasoned analysis. This points out, that the definition of all facts is referring to the technical, cultural and individual structure of the specific observer. This also makes it understandable, that from similar structures only similar situation descriptions are to be expected - a confirmation of the *Eigenbehavior* formulated by H. v. Foerster. [v. Foerster 1993]
As long as the solution and decision-making authority is able to find the right answers - based on axioms, current laws and confirmed experiences - for complex life problems, no additional information will be required for an analysis of the specific situation. If there are very different experiences or views, structural inertia and the inability to find new ways of thinking how to
deal with substantial changes of the environment, generate barely to overcome obstacles. [Hüther 2007]

The ability to adopt to changing environmental conditions since Darwin is understood as the survival of the fittest. The ability of a system to adopt, thus becomes an essential criterion for the possible stabilization of the system, despite the everlasting change of environmental conditions. It should be remembered that every system and every observer - the observer himself is to be defined as a system and operates out of at least one specific system - are embedded in an environment, that may be described as a system too. This kind of observation leads to an overwhelmingly large landscape of embedded systems. Looking at these variety of systems as elements of a system and assuming that this superior systems are structurally determined, self-referential and autopoetically organized - the final recognition of something called stability seems plausible. And again this confirmation of the intrinsic value of a system refers to the term *Eigenvalue*.

These conditions of stability, also referred to as balance, may be reasonable aspects to be interpreted as cause-and-effect driven processes from a historical point of view. The abilities to consider observations of recent developments as a possible aspect of prediction for future trends is possible only with addressing linear dynamics and abstract reductionism as a basis. This assumes stability and therefore unchanging environmental conditions. A scenario, that can't be argued in everyday life. In living environment – mandatory a non-trivial process – this is not possible to accept. That is, what the sciences of meteorology and the daily weather forecasts forcefully put across. This intended or actually occured stability – balance – order is not the result of operations outside the brain, but from the interaction of the involved internal components and arises spontaneous. [Roth 1990] Roth argues similar to Maturana and Varela against the interpretation, that self-organization, self-referentiality or autopoiesis is inherent to all possible processes of physical particles up to cosmological processes[Maturana/Varela 1987]. It seems rather to be necessary to distinguish an observable spontaneous order from within certain boundaries.
For this reason, the recurring question concerns the position of the observer and of the possibility of an absolute definition of the environment for an observable system. This question is unanswerable, because any definition of the world demands a definition of the environmental world. So every world (system) needs at least one world above (around). This kind of question cannot lead to specific answers – formulated Heinz von Foerster : „The hard sciences are successful because they deal with the soft problems; the soft sciences are struggling because they deal with the hard problems."[v. Foerster 1972]

Dealing this way with complexity in many different fields of science provides basic descriptions in *Theories of Complex Systems* as a possible interpretation of observable incidents in the world. These theories often seem to be applicable. A suggestion, that science has driven since its origins, can however be abandoned with the description of complex processes. The namely claim, to be able to explain the world like it is. It turns out, particularly in dealing with complexity, that even the definition of the world itself represents an unsolvable problem, because no observer can overlook the world as a whole, because the observer herself/himself has to be a part of the observed. The attempt to define the world leads to some kind of metaphysics as theory that could describe the world – especially as the real world - not as it appears to us. Metaphysics therefore would be the inventor of the world. In comparison to the world, the universe as a researchable matter of science must be smaller than the world.[Gabriel 2013]

Path Dependence – Possibility - Probability

This chain of distinctions, that lead to our these days valid image of the world, can be described as a path we depend on. This path dependence may be ascribed to a single human beeing, a family, to society, to culture, to science, to religion, even to mankind. Every distinction this way opens some kind of new possibility / probability space and deminishes the possibility / probability space the observer was facing before the specific distinction was made.
These multiple distinctions and path dependencies every observer is embedded in, at the same time open new observation abilities within the observers system – deminishes the observers ability to observe the former environment, because, the systems and the elements, the observer is describing are getting smaller an smaller.
This way the question of the world necessarily leads to the definition of a systems and the ratio of the resulting relations between systems and environments. That way complexity is reduced to a level, on which scientifically oriented and educated observers are enabled to make rational analyses.

The tools, which one makes use of, are increasingly powerful computers and algorithms = rules that enable complex modeling and simulation of individual phenomena. The simulations with systemic feedback, iterations and recursions allow to observe processes under (almost) natural circumstances. Processes, that could not be observed in living environment. The observer is able to recognize recurring patterns as organizing structures and to formulate and abstract these patterns with

mathematical model description. It should be remembered, of course, that these simulations need a base of self-referential, cybernetic algorithms – remember the term *Eigenbehavior*. Observable structures – especially in a scientific experiment - require recurring order as comprehensible facts and therefore can be described as stable states. Complexity then is present when the process order within a system is shaped by self-organization concerning many elements that follow nonlinearity.[Mainzer 1999] The discussion on complexity within specific scientific areas deals with the dynamics of the elements by means of the description of phase transitions and a possible calculation of order parameters. Klaus Mainzer presents examples from physics, chemistry, biology, ecology, computer science, neuroscience, medicine, psychology, sociology, economics, philosophy of science and science studies.[Mainzer 1999] In view of the diversity of research areas in the natural and social sciences, complexity studies try to gain a basic knowledge concerning sensitivity of correlations in nature and society, in addition to a possible predictability of complex contexts.
This possible predictabiliy relates to the probability space mentioned above.

The term probability itself includes that this kind of predictability of complex contexts never can be for sure. With the fact of *Eigenvalue* in mind, we can say that iterations of probability lead to improbability of prediction. (For further explanation of this idea and perhaps to stimulate your thoughts, you might have a look at the figures at the end of this article.)

What about the concept of chance (accident)? This only can be geared to the fact, that there are no rules or patterns to describe the respective incident, that was observed. The description of a coincidence hence is necessarily always the shortest description of the process itself. Would there already exist a descriptive algorithm for this particular incident, nobody would name this incident chance or accident. However, the occurrence of chance can not be equated with arbitrariness or with the circumstance, that e v e r y thing might be possible. Inside the systemic organized levels of observation, conditional dependencies give a possibility space for the process an observer may call chance, accident or random.

No Thing or E v e r y Thing possible

Considering the former systemic description of systems, environments, observers and path dependences the situation of e v e r y thing might be possible would imply that no distinctions at all would have been made. With no distinctions made we could not even talk about a sort of thing, we could not even talk about any world, we could not even talk at all - we would not even be. This point of view implies, that talking about nothing / no thing / nothingness is like talking about something whole, we could not even grasp and therefor are not able to talk about.
On the other hand we could say, that with e v e r y thing might be possible, we think of unlimited possibility, that is inherent to space and time we are embedded in.
Being in this world means to draw distinctions and this way reduce complexity to be able to survive. Being in this world means to participate in various systems. These systems on the one hand support our ability to gain stable states (balances) – on the other hand determine our imagination and our thoughts.
Inspite of this kind of systemic determination we are able to find new descriptions of what we observe - and this way are able to influence the systems, we are embedded in and choose a path that opens new possibilities.

The ultimate distinction

we are not able to transcend

turns out to be

being human

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Exponential tendency to improbability

within the process of time

probability of
90% on the upper left
99% on the upper right
99,9% on the lower left
99,99% on the lower right
leads to improbability

0,9^1	0,900000000000000	0,99^1	0,990000000000000
0,9^10	0,348678440100000	0,99^100	0,366032341273229
0,9^20	0,121576654590569	0,99^200	0,133979674857962
0,9^30	0,042391158275216	0,99^300	0,049040894071286
0,9^40	0,014780882941435	0,99^400	0,017950553275045
0,9^50	0,005153775207320	0,99^500	0,006570483042415
0,9^100	0,000026561398888	0,99^1000	0,000043171247411
0,9^333	0,000000000000001	0,99^3333	0,000000000000003

0,999^1	0,999000000000000	0,9999^1	0,999900000000000
0,999^1000	0,367695424770964	0,9999^10000	0,367861046432970
0,999^2000	0,135199925397499	0,9999^20000	0,135321749482760
0,999^3000	0,049712393998036	0,9999^30000	0,049779600369868
0,999^4000	0,018279019827489	0,9999^40000	0,018311975883075
0,999^5000	0,006721111959866	0,9999^50000	0,000045377233959
0,999^10000	0,000045173345977	0,9999^100000	0,000045377233959
0,999^33333	0,000000000000003	0,9999^333333	0,000000000000003

Walter Karban

Dr. phil., Researcher for Theory of Cognition / Epistemology

wk@inmotion.at

Cosmological Aspects in Natural Philosophy in East Asia

– Classic Theories and Innovation for a global World

Human Typology in Integrative Medicine

Karl W. KRATKY (Vienna/Austria)

Introduction

If we consider physiology and pathology, we find common features in all humans as well as ethnical and individual differences. For decades, orthodox Western medicine considered humankind as a whole, which was maybe influenced by political correctness ("All human beings are ... equal in dignity and right ... without distinction of any kind, such as race, colour, sex ...", The Universal Declaration of Human Rights. 1948). As a first deviation from that attitude, the so-called gender medicine appeared around 2000. Due to genetic engineering, even the idea of a personalized medicine has emerged in the last years.

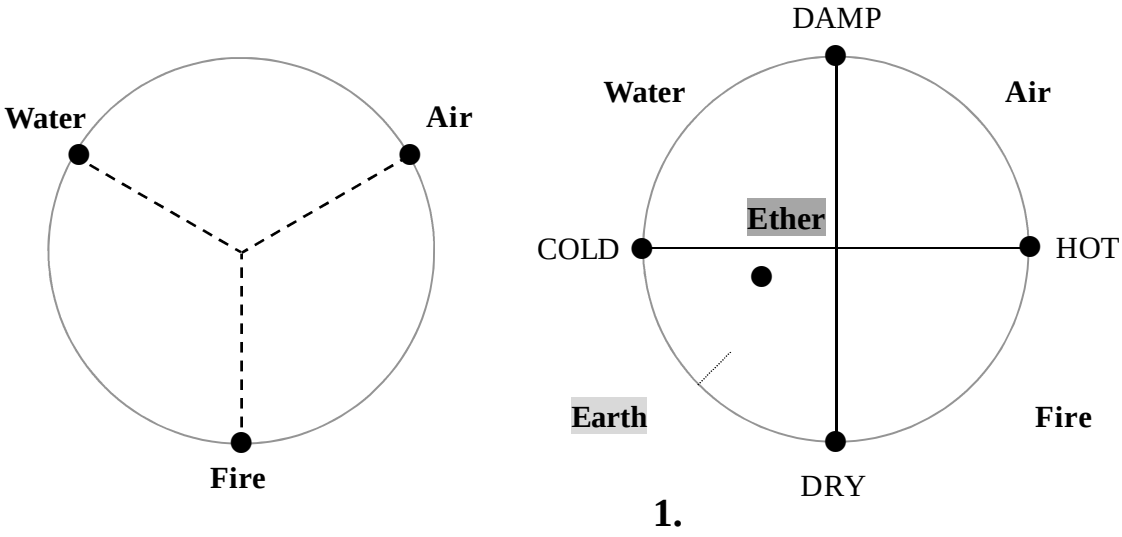

Figure 1. Arrangement of the Greek elements. **a)** ternary scheme (without earth), until 450 B.C. **b)** later four- und fivefold schemata (without and with ether, respectively), with reference to the temperature and moisture axes.

In complementary medicine, an intermediate position is widespread since centuries. A smallish number of principles or regulatory types are considered in order to differentiate between categories of (physiological) behaviour. Treatment is type-specific and does not only depend on the symptoms of a given disease. For instance, 4 temperaments (phlegmatic, sanguine, choleric and melancholic) were considered in Greco-Roman antiquity. They were attributed to the 4 elements water, air, fire and

earth, respectively. In Table 1, further attributions can be found. Incidentally, some of the tables and figures in the present paper are modifications of tables and figures in Kratky (2008).

Table 1. Sequences by analogy of the four Greek elements in Late Antiquity.

Element	Water	Air	Fire	Earth
Body fluid	Phlegm / mucus	Blood	Choler / bile	Black bile
Organ	Brain	Heart	Liver	Spleen
Temperament	Phlegmatic	Sanguine	Choleric	Melancholic
T & m *	Cold & damp	Hot & damp	Hot & dry	Cold & dry
Taste	Salty	Sweet	Bitter	Sour, pungent
Colour	White	Red	Yellow	Black
Season	Winter	Spring	Summer	Autumn
* T & m: reference to temperature and moisture				

In Figure 1b, the 4 elements were arranged in pairs (water – fire, air – earth), with reference to a temperature and a moisture axis. Later, ether was added as 5th element, which played a specific role. Thus, the total structure can be symbolized by 4+1.

Comment: The mentioned elements should not be confused with the physico-chemical elements of today like hydrogen or oxygen. We often have difficulties when comparing concepts and terms of traditional systems and recent developments. It is a question of usage, not of being right or wrong.

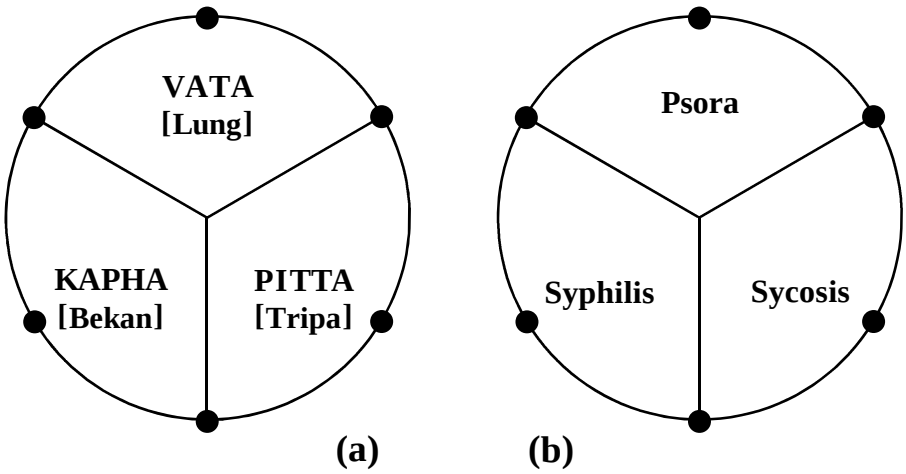

Figure 2. The **three regulatory types** or principles in East and West.
a) Ayurveda: **doshas** vata, pitta & kapha, Tibetan medicine: **nyes-pas** lung, tripa & bekan.

b) Homeopathy: **miasmas** psora, sycosis and syphilis.

Sometimes, ternary systems occur, cf. also the early system of 3 Greek elements, Figure 1a. In several medicine systems, 3 regulatory types or principles can be found,

e.g., the in Ayurveda (= Indian medicine), Tibetan medicine and homeopathy; cf. Figure 2. The 3 nyes-pas of Tibetan medicine are practically identical with the Ayurvedic doshas, the homeopathic miasmas being a similar conception. The general structure is 1+2: one type (dosha vata, nyes-pa lung, miasma psora) is at a higher level. In a way, it integrates the 2 other types that are complementary to each other. Further considerations concerning bipolarity and triadicity can be found in Kratky (2015).

In the case of the doshas, typical attributions are:

Vata: changeable, **pitta**: intense, **kapha**: constant. (1)

Vata (V): dry & cool (neutral temperature); (2a)
Pitta (P): damp & hot, (2b)
Kapha (K): damp & cold. (2c)

More detailed information concerning the doshas can be found in Table 2.

Table 2. The three doshas in Ayurveda broken down into the typical predispositions (+) and their negative aspects (–).

Characteristics	Vata (V)	Pitta (P)	Kapha (K)
Mind (+)	flexible	critical	perseverin g
(–)	overly sensitive	intolera nt	unyielding
Life style (+)	fond of travelling	athletic	enjoying
(–)	unsettled	daredevi l	luxurious
Feeling (+)	elated	humoro us	content
(–)	anxious	wrathful	gloomy

Ternary systems in ancient China

In Chinese medicine, there seems to be a binary system instead of a ternary one. Yin and yang as primary complementary pair is basic there. Important properties or, rather, equivalencies can be found in Table 3.

Table 3. Some characteristics of yīn (陰) and yáng (陽)

Yin	Cold	damp	deficiency	internal	dark	below	structure
	feminine						
Yang	Hot	dry	excess	external	light	above	dynamics

	masculine

However, in ancient daoistic times, the number three was considered to be very important. For instance, one can look up the Daodejing of Laozi. It is an important book of Chinese daoism and is about 2400 years old. For our considerations, verses 1 and 42 are especially relevant. In the translation of Goddard and Borel (1919/2009):

V1: Tao produces **unity**; unity produces **duality**;
duality produces **trinity**; trinity produces **all things**.

V42: All things bear the **negative principle** (yin)
and embrace the **positive principle** (yang).
Immaterial vitality, the **third principle** (chi), makes them harmonious.

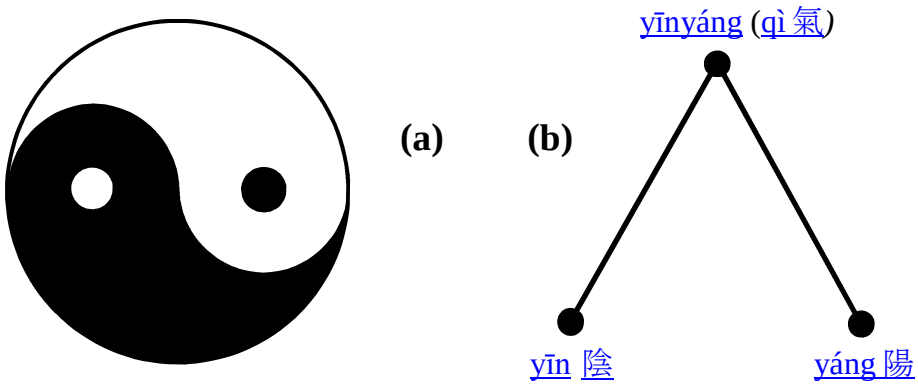

Figure 3. *Yin*, *yang* and *yinyang* (or *qi*) are symbolized in two ways. **a)** *Yin* (black, with a white dot) and *yang* (white, with a black dot), yielding the *taiji* symbol. **b)** *Taiji* as 'high roof ridge'.

Thus, we have again two complementary principles, yin and yang, and a unifying third one called qi – or also yinyang, cf. Kubny (1995, p.170f). Figure 3 shows two visualizations of that triad. Figure 3b may be compared with the graphic representation of the three regulatory principles in Figure 2.

Table 4. Comparison of YIN, YANG and YINYANG with other ternary systems.

Chinese triad	YIN	YANG	YINYANG
Characterization Temperature Three treasures	Yang deficiency Cold Jīng 精 / essence	Yang excess Hot Shén 神 / mind, spirit	Yin deficiency Neutral Qì 氣 / breath ...
Western triad Worldwide triad Indian triad	Matter Body Kapha	Energy Mind Pitta	Information Soul Vata

Moreover, Table 4 shows several triads that are similar to yin – yang – yinyang. Another triad that can be found worldwide in philosophic and spiritual traditions: the axis mundi (cosmic axis) with its three realms (upper, middle and lower); cf. Table 5.

Table 5. The three realms of the cosmic axis.

Designations in philosophic and	spiritual context		Ancient China
Upper world	heaven	above the earth	'Heaven' 天
Middle world	earth	on earth	'Human' 人
Lower world	netherworld	under the earth	'Earth' 地

We live only in a thin intermediate zone, regardless of whether we interpret the cosmic axis spiritually or geographically. This zone is essentially the *surface of the earth* (ground, soil, humus layer). There is the risk of confusion with the *planet earth* that lies deeper below our feet. Thus, it depends on our mindset whether 'earth' in the axis 'heaven – earth' refers to the middle or the lower world. In traditional Chinese thinking, 'Earth' (地, dì) belongs to the lower world. In total, the Chinese expressions for the three realms are 'heaven', 'human' and 'earth', cf. Table 5 and Figure 4. It should be mentioned that *earth* as *soil* (土, tǔ) belongs to the 'human' realm, see below.

'Heaven' 天 tiān (pure or absolute **yang**)

'Human' 人 rén

'Earth' 地 dì (pure or absolute **yin**)

Figure 4. The 3 realms in ancient Chinese thinking (sāncái 三才, the 3 talents)

In a further step, three-fold combinations of yin and yang have been considered in ancient China, resulting in the so-called trigrams; cf. Table 6. A broken line means yin (value 0), a solid line yang (value 1). Thus, the trigrams are associated with binary numbers (the bottom line being the most important one). Their decimal value is displayed in Table 6, too. The trigrams fall into three groups:

* 'Heaven', the absolute yang, consisting of three yang lines (⚊⚊⚊)
* 'Earth', the absolute yin, consisting of three yin lines (⚋⚋⚋)

*   Six "mixed" trigrams consisting of yin and yang lines.

Table 6. Characterization of the 8 trigrams shown in numeric order (*yin:* – – , *yang:* ——).

Trigram	– – – – – –	—— – – – –	– – —— – –	—— – – ——	– – – – ——	—— —— – –	– – —— ——	—— —— ——
Number	0	1	2	3	4	5	6	7
Name	**'Earth'**	Mountain	Water	Wind	Thunder	Fire	Marsh [a]	**'Heaven'**
Element	(Earth)	Earth	Water	Wood [b]	Wood	Fire	Metal	(Metal)
Inter-pretation	Yin-Earth	Yang-	Yin-Water	Yang-	Yin-Fire	Yang-	Yin-Metal	Yang-

[a] see Franks (2016, Ch.4). Another translation is *lake,* cf. Blofeld (2000, Appendix).
[b] In other circumstances, it has been called *grains* (or associated with *earth*, *water* or *fire*).

These mixed trigrams can be associated with the 'human' realm; cf. Table 5 and Figure 4. In this realm, Chinese medicine considers the five elements wood, water, earth, fire and metal. Some names seem familiar, others not. Later on, we will come back the Chinese elements in some detail. Now we will only come to the fact that there are six trigrams for five elements. Thus, one element has to occur twice, viz. wood. Furthermore, the two absolute trigrams are also associated with an element each: 'Heaven' and 'Earth' are attributed to elements metal and earth, respectively (displayed in parentheses in Table 6).

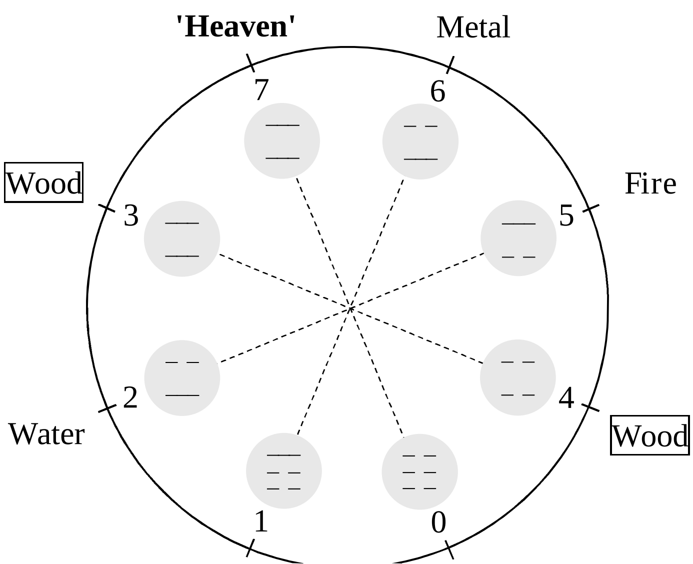

Figure 5. Two-dimensional arrangement of the 8 trigrams (in accord with the prenatal sequence). **'Heaven'** & **'Earth'** are folded down into the 'Human' range. Two trigrams are associated with the element wood.

In Chinese literature, two planar graphic realizations of the 8 trigrams can be found: the prenatal and the postnatal sequence; cf. Franks (2016, Figs. 4.11 and 4.10, respectively). We will stick to the prenatal sequence. There, pairs of complementary trigrams (algebraic sum: 7) lie on opposite sides and form an axis each, cf. Figure 5. In this figure, the prenatal sequence is in essence mirrored horizontally compared to the usual illustration, but the geometric relations between the trigrams remain the same.

Folding back 'Heaven' and 'Earth' to the vertical axis results in the arrangement displayed in Figure 6. The hexagonal structure of the horizontal plane may be compared with Figure 2.

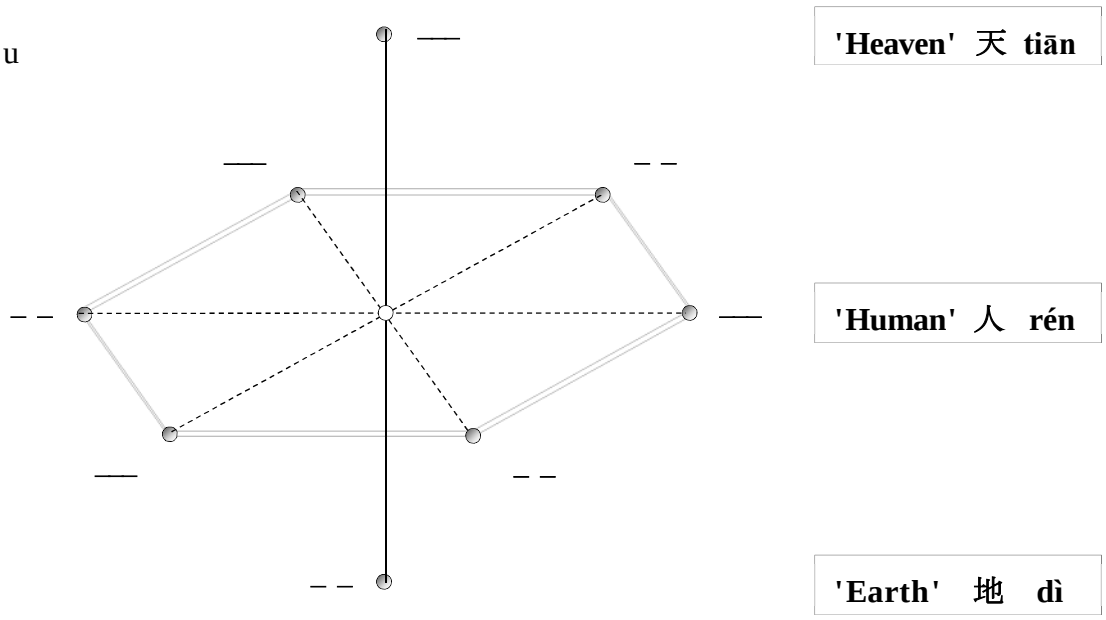

Figure 6. Three-dimensional arrangement of the 8 trigrams**.** The 6 extended elements lie in a horizontal plane (' **Human** '), the axis between **'Heaven'** & **'Earth'** is vertical.

The polar pairs define the axes in Figures 5 and 6:

Axis: **'earth'** 0 – **'heaven'** 7 (3)

Axis: earth 1 – metal 6 (4a)

Axis: water 2 – fire 5 (4b)

Axis: wood /wind 3 – wood /thunder 4 (4c)

Asian medicine systems: China, India, Tibet

We come back to the similarity of Chinese and Indian triads, Figures 3b and 2a, respectively. Figure 7 displays a direct comparison. For details, see Kratky (2008, Chs.7-9).

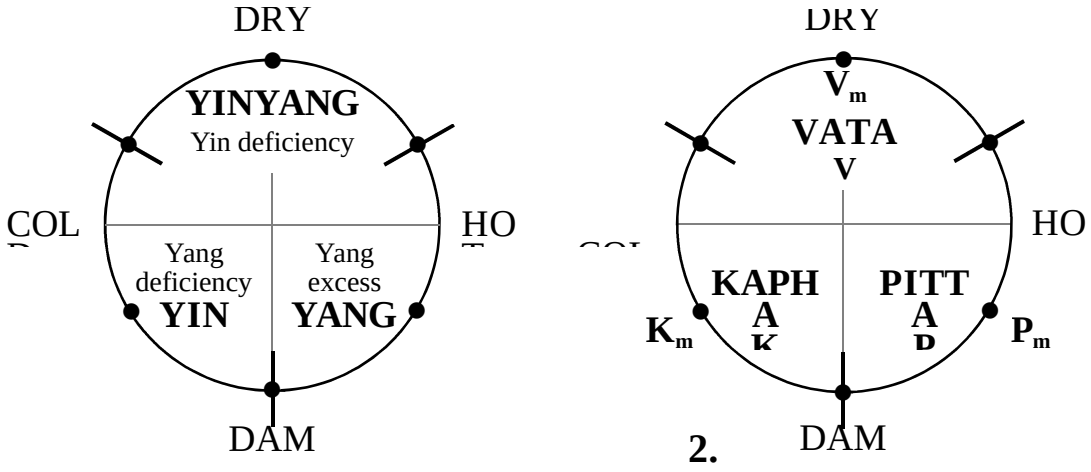

Figure 7. Circle representation of Chinese and Indian triads in relation to temperature and moisture axes. The 3 types dominate a circular arc of 120° each. The centres and borders of the regions are marked by dots and bars. **a)** YIN, YANG and YINYANG. b) Ayurvedic doshas VATA (V), PITTA (P) and KAPHA (K). The 3 centres are designated V_m, P_m and K_m, respectively, where *m* stands for *mean* or *middle.*

As already mentioned above, 5 elements (also: phases, elemental phases, agents) can be found in Chinese medicine: earth, wood, water, metal and fire. In Chinese Medicine, *fire* is sometimes split up into *ruling fire* and *minister fire*, cf. Appendix 3.2 "The Six Qi and the Five Agents, Ruling Fire, and Minister Fire" in Unschuld (2003). This is an indication of a latent system of 6 elements. This matches the statement of Granet (1993) that an oscillation between numbers five and six can be found in

ancient China. On p.236, he reports on a sixth element – relating to nourishment – as "doubling of earth". We have already found an analogous "doubling of wood" in the case of trigrams, Figures 5 & 6. Unschuld (2003, p.101) refers to *grains* as ancient sixth element: "A reference in the *Zuo zhuan* ... including water, fire, metal, wood, soil, and grains, may be regarded as a hint at an enumeration of six items that was narrowed down to a grouping of the five agents by eliminating the grains." Thus, Unschuld uses the translation *soil* instead of *earth*.

Nowadays, neither *earth* nor *wood* play a specific role. By contrast, this is the case for *fire* and *water* in Chinese and Tibetan medicine, respectively. This can be seen from the relation of the elements and the 12 meridians (also: vessels, channels, conduits). The latter combine to yin- and yang-pairs, each pair corresponding to an element. Since 6 pairs do not fit 5 elements, two pairs are attributed to one of the five elements, which is *fire* (China) and *water* (Tibet) – two polar or complementary elements. In the following comparison, we restrict ourselves to the more important yin-meridians and organs:

Chinese:	**(ruling)** fire: heart	(5a)
Tibetan:	fire: heart	(5b)
Chinese:	water: kidney**(s)**; **(minister) fire: pericardium**	(6a)
Tibetan:	water: **right** kidney; **water**: **left kidney**	(6b)

The differences between Chinese and Tibetan medicine are in bold print. Especially important are the differences between the second halves of (6a) and (6b). Putting emphasis on *fire* in Chinese medicine results in "doubling the heart" (heart, pericardium), stressing *water* in Tibetan medicine corresponds to the differentiation between the two kidneys (right, left kidney).

To avoid confusion when developing a cross-cultural medicine, a sixfold division of elements has been chosen, and a new name for the sixth element was introduced in Kratky (1997), namely *flora*. Furthermore, the Chinese elements are characterized by curly brackets, cf. Kratky (2008). Furthermore, expressions of Ayurveda and Tibetan medicine are marked with angle and square brackets, respectively. This helps to avoid confusion, too, when comparing different medicine systems. For instance, there may be a relation between Greek earth and Chinese {earth}, but one cannot assume that they are identical.

In two steps, the representation of the axes shown in (4a-c) and in Figs. 5 & 6 turns into:

Axes: water – fire, earth – metal, wood/thunder – wood /wind; (7a)
Axes: water – ruling fire, earth – metal, wood – minister fire; (7b)
Axes: {water} – {fire}, {earth} – {metal}, {wood} – {flora}. (7c)

The attribution of wood/thunder to the usual wood of Chinese medicine has been chosen after detailed inspection of the properties of the corresponding trigrams and elements.

Table 7. Correspondences of the Chinese elements. As to the properties of {flora}, cf. Kratky (2008, Ch.7).

Yin/yang pair of Meridians	Back	Front	Middle
Element (foot)	**{Water}**	**{Earth}**	**{Wood}**
Layer, tissue	Bones	Muscles	Tendons
Taste	Salty	Sweet	Sour
Climatic influence	Cold	Dampness	Wind (gusty)
Element (hand)	**{Fire}**	**{Metal}**	**{Flora}**
Layer, tissue	Hypodermis	Epidermis	Outmost / inmost
Taste	Bitter	Pungent, acrid	Harsh/astringent; bland
Climatic influence	Heat	Dryness	Calm (draught)

Table 7 relates the axes displayed in (7c) with the location of the 6 yin-yang pairs of meridians in the body. Correspondingly, the axes displayed in (7c) sequentially refer to back, front and middle.

In a last step, we compare the Chinese elements with the Indo-Tibetan regulatory principles via Tibetan pulse diagnosis, which considers the regulatory principles as well as the Chinese meridians and elements:

1st Pulse position: {metal} and disturbances in ⟨vata⟩ / [lung], (8a)

2nd Pulse position: {wood} and disturbances in ⟨pitta⟩/ [tripa], (8b)

3rd Pulse position: {water} and disturbances in ⟨kapha⟩ / [bekan]; (8c)

cf. Asshauer (1993, p.107) and Reichle (1997, p.172). Now, the circle representation of Figure 7b can be extended in order to incorporate the Chinese elements. The result can be looked up in Figure 8. The axes are the same as in Figures 5 and 6 (trigrams) and Table 7 (location in the body). The sequence of elements in Table 7 corresponds to the sequence in Figure 8 starting with water and then continuing counter-clockwise. The position of the specific element {flora} is very specific, too. Due to Ayurveda, the border vata / kapha has to do with birth and death.

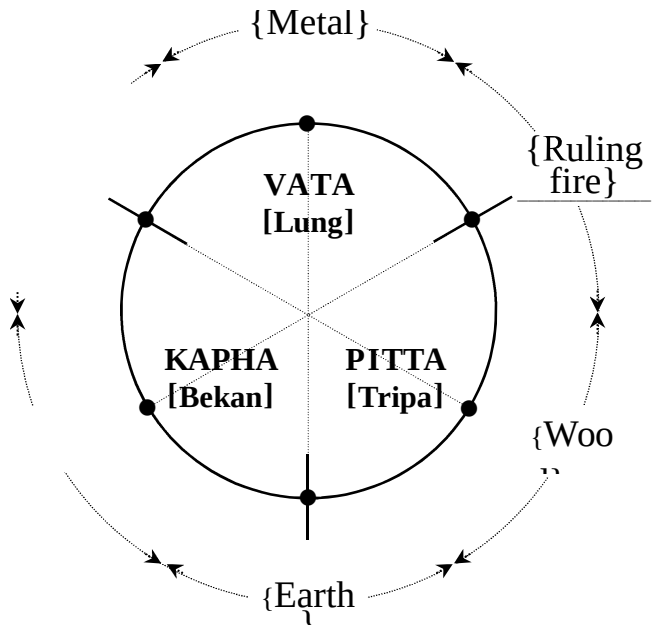

Figure 8. Circle representation of Indian and Tibetan regulatory principles compared to the Chinese elements. As to the interpretation of the axes, see the text.

Thus, aspects of Chinese, Indian and Tibetan medicine have been interrelated via Figure 8. This comparison has been enhanced in Kratky (2008, Chs.8-9) by extending the circle representation to the two-dimensional disc representation ("health disc"). We will not go into details here, but we will come back to the optimal number of dimensions later.

Indo-Tibetan Elements

In Ayurveda and Tibetan medicine, one can find a system of 5 elements, too. Contrary to Chinese medicine, the Indo-Tibetan elements have essentially the same names as in late Greco-Roman antiquity (just "space" instead of "ether").

Indo-Tibetan elements: water, fire; earth, air; space (ether). (9)

Table 8. Assignment of Indo-Tibetan elements to the three regulatory principles, namely the Indian doshas and the Tibetan nyes-pas. Three variants are displayed.

Source reference	⟨Vata⟩/[Lung]	⟨Pitta⟩/[Tripa]	⟨Kapha⟩/[Bekan]
Ayurveda [a]	⟨Air⟩, ⟨Space⟩	⟨Fire⟩	⟨Earth⟩, ⟨Water⟩
Ayurveda [b]	⟨Air⟩, ⟨Space⟩	⟨Fire⟩, ⟨Water⟩	⟨Earth⟩, ⟨Water⟩
Tibetan medicine [c]	[Air]	[Fire]	[Earth], [Water]
[a] Dash (1999)	[b] Chopra (2001)	[c] Qusar et al. (1997)	

The elements are allocated to the 3 doshas and nyes-pas in Ayurveda and Tibetan medicine, respectively. However, the literature is not consistent, cf. Table 8. In Ayurveda, the elements are often classified according to the first variant displayed in the Table. In this case, pitta is represented by a single element, ⟨fire⟩, whereas two elements are attributed to vata and kapha each. Perhaps in order to remove this asymmetry, there is a second variant where ⟨water⟩ is not only associated with kapha, but also with pitta. This probably has something to do with the fact that pitta is hot as well as damp, cf. (2b), which is not ensured by the dry ⟨fire⟩.

However, another principle different from ⟨water⟩ may go better with pitta: ⟨agni⟩. This is an important Ayurvedic term that is closely related to pitta but is not considered as an element. By the way, *(jathar-)agni* also means *fire of digestion*. Indeed, digestion is characteristic of pitta. Furthermore, digestion occurs in an aqueous setting and thus contributes to the damp and hot characteristics of pitta, see (2b).

Now, we come to the circle representation of Indian and Tibetan elements, cf. Figure 9a and 9b, respectively. According to Table 8, we divide the circle into six and four parts, respectively. Furthermore, we assume that in Ayurveda there are the same two polar pairs as in Greco-Roman antiquity:

Polar pairs: ⟨**air**⟩ in V – ⟨**earth**⟩ in K; ⟨**fire**⟩ in P – ⟨**water**⟩ in K. (10)

The elements of a polar pair lie on opposite sides of the circle. Since the corresponding doshas are known, cf. Table 8, the approximate locations follow immediately, see the dark grey regions in Figure 9a. Then, the two light grey regions remain. The region in vata corresponds to ⟨space⟩, the region in pitta to ⟨water⟩ or

⟨agni⟩. Since ⟨water⟩ in kapha is not adjacent to pitta, we choose ⟨agni⟩. It is underlined in Figure 9a to indicate that it is not a usual element. The same is the case for {flora}, the Chinese elements being displayed outside the circle according to Figure 8. One can see that the Indian elements are arranged staggered in relation to the Chinese ones.

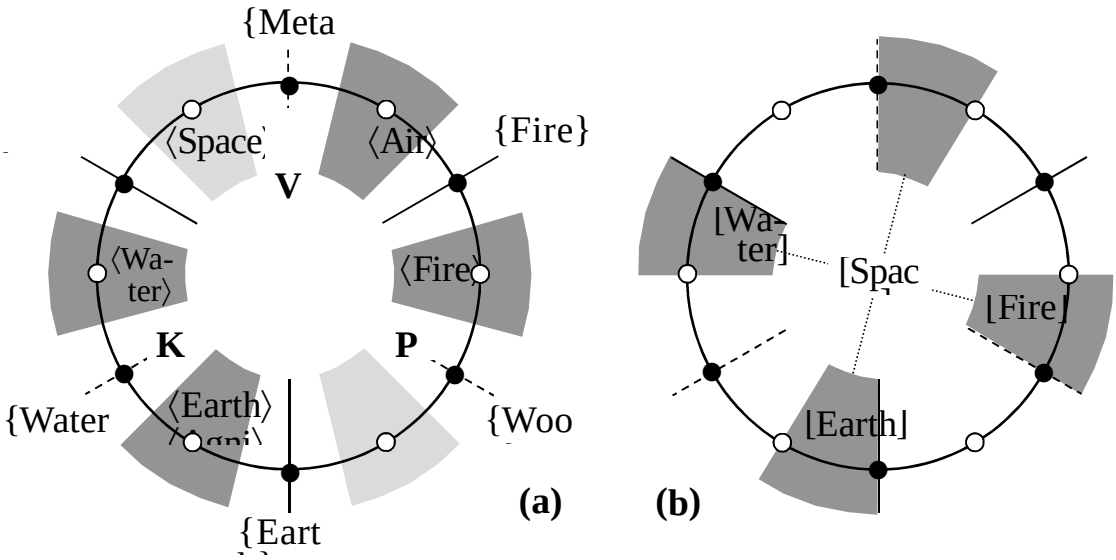

Figure 9. Relationship between the doshas (vata **V**, pitta **P**, kapha **K**), {Chinese} and Indo-Tibetan elements. **(a)** ⟨Indian⟩ elements. The special role of {flora} and ⟨agni⟩ is explained in the text. **(b)Fehler! Textmarke nicht definiert.** [Tibetan] elements.

Now we come to Tibetan medicine. There, [space] does not belong to any nyes-pa, cf. the third variant in Table 8, since it permeates everything (Qusar et al. 1997, p.7). We assign it to the circle centre like *ether* in Figure 1. The location of the remaining four elements to the nyes-pas can be deduced, for example, from the information in Qusar et al. (1997, p.32):

[**Air**]: amplifies V, diminishes K; [**earth**]: amplifies K, diminishes V; (11a).

[**Fire**]: amplifies P, diminishes K; [**water**]: amplifies K, diminishes P. (11b)

Thus, we have the polar pairs

Polar pairs: [**air**] in V – [**earth**] in K; [**fire**] in P – [**water**] in K; (12)

which corresponds to the Ayurvedic relation (10). However, now there are only these four elements on the circle which shifts their location a little bit, cf. Figure 9b.

Discussion and outlook

Comparison of the graphical representation of the Chinese, Indian an Tibetan elements
reveal interesting aspects.

Three elements; i.e. *water*, *fire* and *earth*, have the same name in the medicine systems considered. *Water* and *fire* are polar pairs for the three systems, and they lie on axes that are close to the horizontal temperature axis (*water*: COLD, *fire*: HOT; cf. Figure 7). The Indian axis ⟨water⟩ – ⟨fire⟩ is horizontal, the Tibetan and Chinese ones are somewhat rotated in clockwise and anti-clockwise direction, respectively.

Similar considerations hold for the polar pairs *earth – air* that lie close to the vertical moisture axis:

⟨**Earth**⟩ and [**earth**]: DAMP and a little bit COLD , (13a)

⟨**Air**⟩ and [**air**]: DRY and a little bit HOT . (13b)

One point, however, is different: In Chinese medicine, there is no element *air*. At the location polar to {earth}, {metal} can be found. Thus, {metal} should have several features of *air*. We cannot go into further details here, but this is an interesting point.

As to the further (extended) elements, the axes ⟨agni⟩ – ⟨space⟩ and {wood} – {flora} are close to one another

⟨**Agni**⟩ and {**wood**}: DAMP and HOT , (14a)

⟨**Space**⟩ and {**flora**}: DRY and COLD . (14a)

Only [Space] is remaining. This Tibetan element has the same name as in Ayurveda; it lies in the centre, though. The seeming discrepancy between Ayurveda and Tibetan medicine concerning *space* can be solved considering the two-dimensional case, i.e. the health disc instead of the circle. For details, see. Kratky (2008, Chs.8-9).

Now we will compare the above results with the Greco-Roman elements, cf. Figure 1. In Figure 10, this is compared with the Tibetan circle representation, Figure 9b. The European configuration seems to be quite "Tibetan", even *ether* is in the centre like the equivalent [space]. However, one has pay attention to the fact that the moisture axes are reverse! Inverting the axis *earth – air* in Figure 10a would result in a configuration that resembles the Tibetan one.

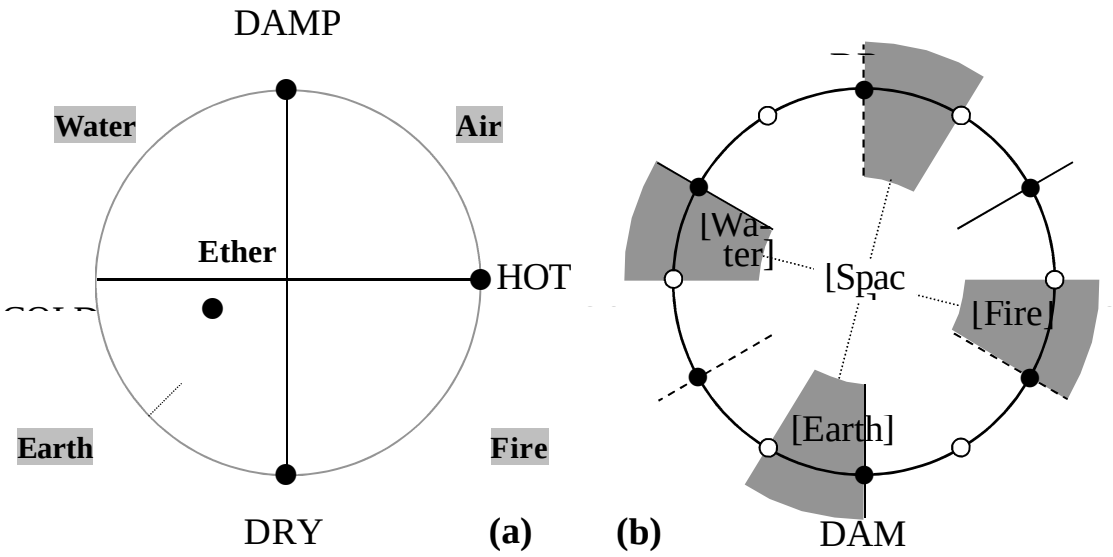

Figure 10. Relationship between **(a)** Greek and **(b)** Tibetan elements. The two configurations look similar. However, the moisture axes are reverse.

And it is not just moisture. The tastes are reverse, too. Table 9 shows the tastes of the Greek and Chinese elements, cf. Tables 1 & 7. Concerning *fire* and *water*, the Greek and the Chinese systems have the same tastes. Concerning *air (metal)* and *earth*, the tastes are in good agreement - but upside down.

Table 9. Tastes of the four Greek elements, compared to the corresponding Chinese ones.

Greek Element	Fire	Water	Air	Earth
Taste	Bitter	Salty	Sweet	Sour, pungent
Chinese Element	{Fire}	{Water}	{Metal}	{Earth}
Taste	Bitter	Salty	Pungent, acrid	Sweet

There are several ways to process the above-mentioned discrepancy. The simplest way is to assume that what is called *air* in the east is called *earth* in the west, and vice versa. This leads to some conceptual and linguistic considerations. For instance, *earth* does not just mean earth in the normal sense, but refers to a principle behind it that could have another name, too. Even the word "element" is ambiguous. Furthermore, terms like *damp* and *dry*, *hot* and *cold* are not just physical science terms, but have a much wider field of meaning, including metaphorical concepts. In this connection, the interesting book of Lan (2015) should be mentioned.

It seems advisable to invent a totally new terminology to avoid confusion when comparing different cultures. Another possibility is usage of concept of recent Western scientific developments (complexity theory, chaos research). There, an abstract state space is used to describe a given complex dynamical system of N variables. If these variables are not independent, mathematical techniques (principal component analysis) can be used to reduce the number of dimensions as far as possible, resulting in a low-dimensional space that can be handled more easily.

In our group, the so-called heart rate variability was studied in some detail (Schäfer 2004, Schäfer & Kratky 2006). It may be considered as the Western counterpart of Eastern pulse diagnosis Taking the 20 calculated variables for a 20-dimensional space, a principal component analysis resulted in n=5 to n=6 (unpublished result). This is an indication that human physiology and pathology may be described quite well by a 5-6 dimensional space. A close connection between this space dimension and the number of above-mentioned elements in complementary medicine systems seems plausible.

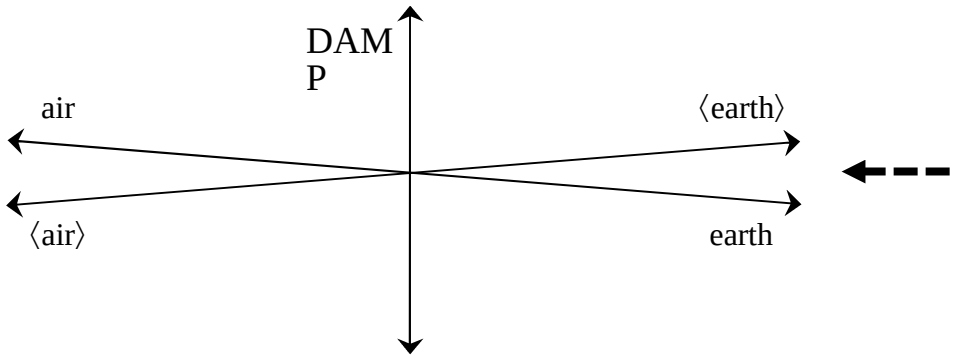

Figure 11. Example of the effect of the projection of the Greek and Indian *air – earth* axes to the vertical *dry – damp* axis. For details, see the text.

This means that the circle and the disc representations are not elaborate enough. Maybe one hast to go to a 5-6 dimensional space. To be as simple as possible, we will stick to a 3-dimensional sphere now. Then, the inversion of earth and air between East and West may just be the consequence of different projections of points or axes from the sphere to a disc or even a circle.

Eventually, we use this argument for a geometric explanation of the "reverse moisture axis" in Figures 10a & b. Now, we assume a fixed vertical axis as moisture axis, see Figure 11. The Greek and Indian *air – earth* axes are air – earth and ⟨air⟩ – ⟨earth⟩, respectively. They lie in the drawing plane and are almost identical, i.e. they form *a*

very acute angle *with one another*. The reader can observe these details easily. This is not the case, however, for a person that looks from the right (thick dashed arrow in Figure 11). This person sees the vertical projection of the Greek and Indian *air – earth* axes to the moisture axis. In this projection, the two axes point in opposite directions: the Indian element ⟨air⟩ as well as the Greek element "earth" turns out to be dry. Thus, it may well be that discrepancies between different medicine systems vanish if one takes an abstract model into account that is elaborate enough.

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Karl W. Kratky

Dr. rer.nat., Professor for Theoretical Physics

University of Vienna, Faculty of Physics

karl.kratky@univie.ac.at

A Zen Buddhist Interpretation of Nature and Consciousness Based on Dependent Origination

William Kigen EKESON (Los Angeles/USA)

Abstract

As a Monk of the Zen Buddhism (*in the Rinzai Tradition*) *I'm going to present a causal model based on the tenants of Zen Buddhism showing how subjective consciousness is linked to inanimate subjective states. In order to do this I will first examine the basic subject-object dichotomy and then develop an approach based on a Zen Buddhist interpretation of Nāgārjuna's theory of Dependent Origination. Using this approach, I will present a new model that uses a series of topological diagrams to illustrate the shared similarities and contrasts between animate and inanimate states. In so doing, a new approach towards understanding the unique nature of subjective consciousness will be mapped out: one that avoids both extremes of physicalism and panpsychism.*

Introduction

It can be argued that the only fact any of us can be one hundred percent sure of is the fact that we are conscious. John Searle astutely states in a 2013 TED talk: *Where the very existence of consciousness is concerned, if it consciously seems to you that you are conscious, you are conscious. It's real and irreducible.* [1]. Thomas Nagel goes into much greater detail in support of the same supposition in his seminal article, *What is it like to be a Bat?* [2]. What consciousness actually IS, is still up for deliberation, but in this presentation I will take it as a given that the subjective experience of consciousness is itself the only necessary proof of its reality. If it's reasonable to assume that our own consciousness can be taken to be beyond question, it can also be argued that the reality of our own subjectivity must also be taken as such. I think this is a necessary point to make because the term "subjectivity" is more universally applicable than the term "consciousness". That is, any conscious state must also be a subjective state but the same is not true about any subjective state relative to conscious states. For example, by any measurable standard, rocks lack consciousness altogether but both rocks and humans manifest themselves as *subjects* without the term necessitating or implying any consciousness or lack thereof. Furthermore, the term

subject is always contextual: every subject implies some conjugal and contrasting *objective* state. Taking as a given that the term 'subjectivity' is contextual and subjects need not be capable of consciousness to be defined as such, I'm going to present a model based on the tenants of Zen Buddhism showing how consciousness arises as a particular expression of subjective states.

Section 1. Subject/object and Figure/ground

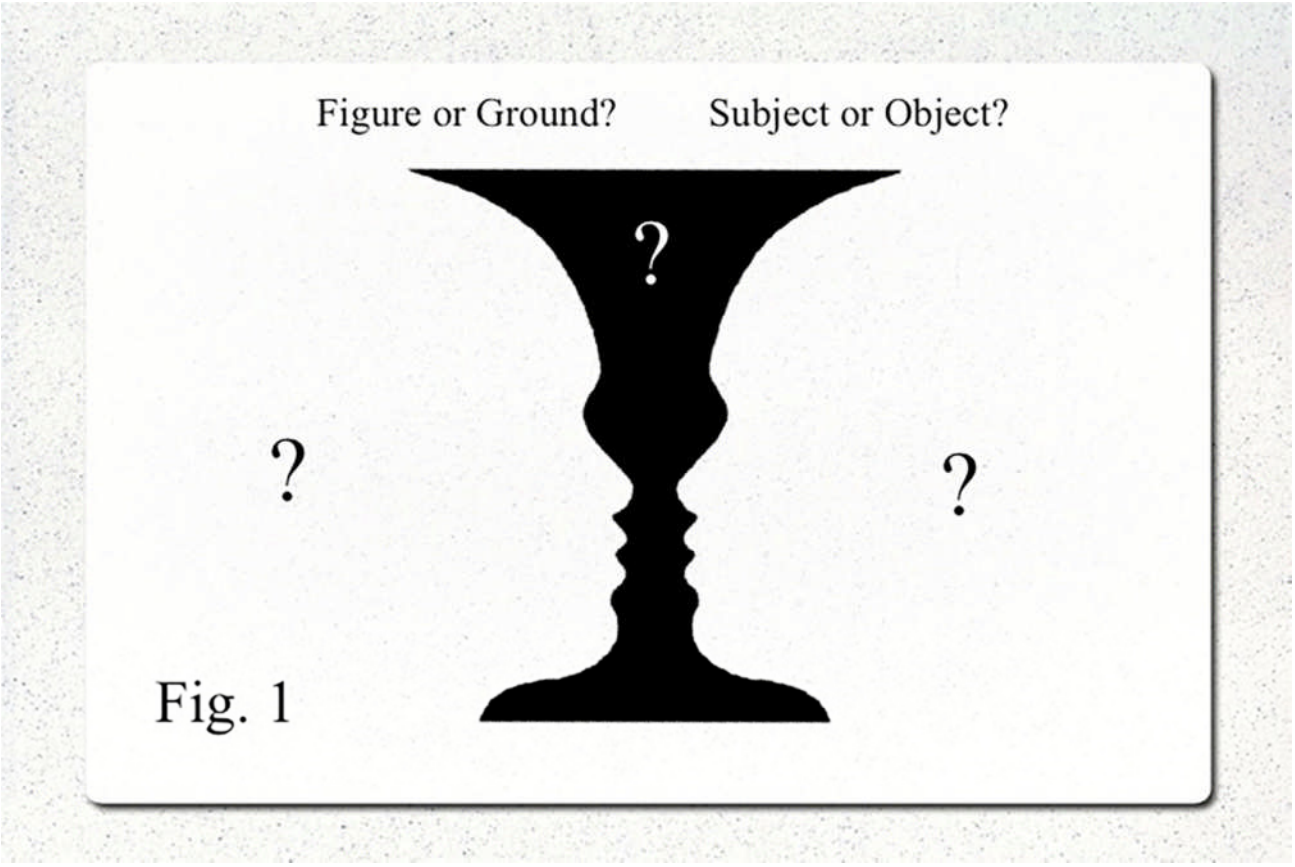


Fig. 1

In the famous Gestalt figure-ground image[3] shown (Fig. 1), the 'figure' can be understood **as** the subject within some 'ground' or context.

In a Western-style objective approach we assume the position of an outside observer and then divide the object field into discrete constituent parts that we provisionally can label as subject/object (i.e. figure/ground). In the above example, we are amused at how what we perceive as the subject can change from being a "vase" to "two faces" and then back again. Positively, this 'impartial' observation allows for the opportunity to compare the similarities and differences between elements in a shared object field. Unfortunately, what this also implies is that the objective designation of subject and object are as arbitrary as our ability to mentally designate (for example) either the vase

or the faces as the subject of the Gestalt image. We ignore the fact that the "true" subject in any figure/ground/observer system is *always* the observer. Ignoring this becomes particularly important when attempts are made to objectively model or explain subjective consciousness. This is clearly exemplified in approaches designating the brain (or nervous system) as the sole generator of human consciousness. In such approaches, consciousness itself is understood and studied merely as an emergent objective phenomenon[4]: one that exists as some localized and discrete characteristic within a larger context.

In contrast to the Western-style observational approach, another type (more common in Eastern thought) tends to emphasize a much more subjectively biased assessment of the figure/ground (subject/object) dichotomy. In such approaches, the objective is trivialized as being nothing other than an extension of the subjective. That is, the white and black gestalt images (as well as any observer) are understood as expressions of a single, ultimate Subject that is fundamentally "non-dual". In recent decades, this *panpsychic*[5] approach has been most famously championed by David Chalmers[6]. In such approaches, all objective phenomena are deemed ultimately nonexistent and/or relegated to "illusory" status because of the ultimate nature of the conscious subjective state. Is there a middle way to describe subjective consciousness that lies between the panpsychic and objectively emergent (i.e. physicalist) extremes? I believe that some ideas originating in Mahayana Buddhism can be useful in addressing these questions in a way that avoids either objective or subjective extremes while laying out a unique "middle way".

Section 2. Dependent Origination

The doctrine of Dependent Origination put fourth by the Indian Mahayana Buddhist philosopher Nāgārjuna (d. circa 250 CE) states that all phenomena are completely conditional and therefore "empty" (Sanskrit; *sunyata*) of any unconditioned "reality", character, or characteristics (Sanskrit; *svabhāva*)[7]. Thus, Dependent Origination necessarily negates the idea that a complete understanding or description of any objective phenomenon (including consciousness) can be arrived at through identifying either material/phenomenal states or constituents (e.g. boundaries, particles, or forces) or non-material subjective qualities (e.g. consciousness), as any such alleged "irreducible" constituents must always themselves be conditional. One might deduce that this approach of taking all things as completely conditional necessarily leads to an

infinite regression. That is, conditioned states are always dependent on other conditioned states, ad infinitum, without there being any ultimate core, meaning, or defining quality for existence. However, using the tenets of Zen Buddhism, I will show that this type of reasoning is likewise flawed, primarily because it ignores the ordered manner in which conditions evolve.

Section 3. A Zen Interpretation

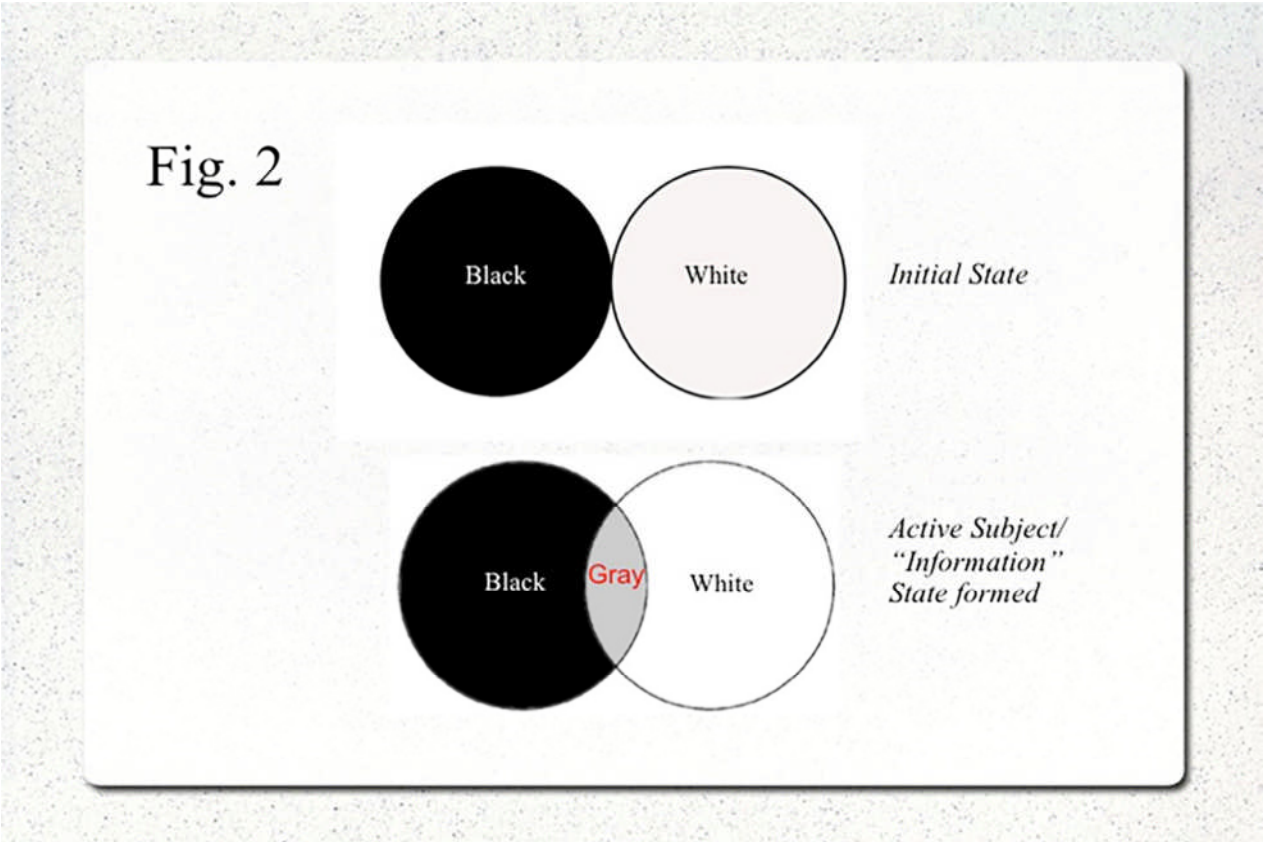
Beginning around the 5th century CE, teachers of the Dhyāna (Jap. *Zen*) school of Buddhism came to China from India and began teaching about Dependent Origination in a practical and purposeful way: through the direct perception and manifestation of it in daily life[8]. This approach quickly gained strong support in many parts of China and eventually gave rise to new philosophical Interpretations (such as *The Five Ranks* and *Rinzai's Four-fold Analysis*)[9] of the original Indian Buddhist teachings. Two of the main tools used to teach Zen are seated meditation (*zazen)* and *kōan* study[10]. Zazen is designed to allow access to the fundamental workings of our own subjective experience. Kōans are specialized questions directed towards students by their teachers in order to deepen the student's insights and understanding discovered through zazen practice. Ultimately, the student is taught to experience their actions outside of formal meditation as being identical in essence to the states of mind experienced during seated meditation. Along with practical training, some Zen lineages include philosophical teachings through which, with careful study under a qualified master, a detailed map of the evolution of the subjective/objective experience is slowly made clear to the student.

In order to help illustrate the Zen interpretation of Dependent Origination, I'd like to introduce another fundamental Mahayana Buddhist model called the *Trikāya*, or the *Three Bodies of the Buddha* [11]. The Three Bodies of the Buddha are: the Dharamakāya (Truth body), Sambogakāya (Bliss body), and the Nirmanakāya (Transformation body) [10]. To the best of my knowledge, my teacher, Joshu Sasaki Roshi, was the first Japanese Master to introduce the Tathagata Zen interpretation of the Trikāya to the West (through fifty years of oral teachings). In this interpretation, the Dharamakāya is understood as the aspect of reality pertaining to our experience of non-differentiation. The Sambogakāya is that aspect of reality pertaining to our experience of relative distinctions (i.e. boundaries) within the cosmos. The Nirmanakāya is that aspect of reality pertaining to our experience of change. The Zen approach suggests that every bit of space and time simultaneously expresses each of

these three bodies and that each of these ‘bodies’ are themselves ontologically linked to each other in a way that, when examined in linear way, offers an elegant and logical interpretation of Dependent Origination. Using the Zen interpretation of the three-bodies model, I’d like to present a Zen version of the previous Gestalt figure/ground example.

In this model, instead of the Gestalt figure/ground relationship (Fig. 1), it begins with two conjoined circles; one black and one white (Fig. 2, Initial state**).** In contrast to the Gestalt figure/ground image, at no two consecutive moments in time can the black-and-white circles maintain a static relationship with respect to each other. To model this conditional dynamism, let the two circles slowly merge and then separate from each other. The conjugal relationship between the inverse ‘qualities’ of black and white models two parts of the Three-bodies model mentioned above. The first of these is unification (Dharamakāya), as both black and white form a single shared boundary/relationship. The second is change/dynamism (Nirmanakāya), as the essence of these opposites is that they function as the change that must occur within/as the function of that shared boundary.

In their initial state, black is completely polarized from white and therefore no “information” about white can exist (within the boundaries of the model) for black beyond the point of their polar boundary. The same is true for white relative to black. As shown in the figure, the negation of the polarity between black-and-white results in the creation of gray in the area of their overlap (Fig. 2, Active Subject). It is this area of overlap that the Zen interpretation of Dependent Origination models as the Sambogakāya, or the birth of what I call an *active subject*/object relationship *within the model*. That is to say, (in a linear analysis of the model) when black-and-white are completely polarized from each other there is no possibility for



active subjectivity or objectivity to be established except by some outside observer. The area of gray overlap can also be thought of as the birth of "*information*" (for lack of a better word) within the Zen model because it's not until an overlap is created that black and white share their actual content (as opposed to merely a border) with each other. It's important to note that the Zen interpretation posits that every active - subject/object state is necessarily 'bookended' by pre-active and post-active conditions relative to itself, i.e. pre-and-post states of existence.

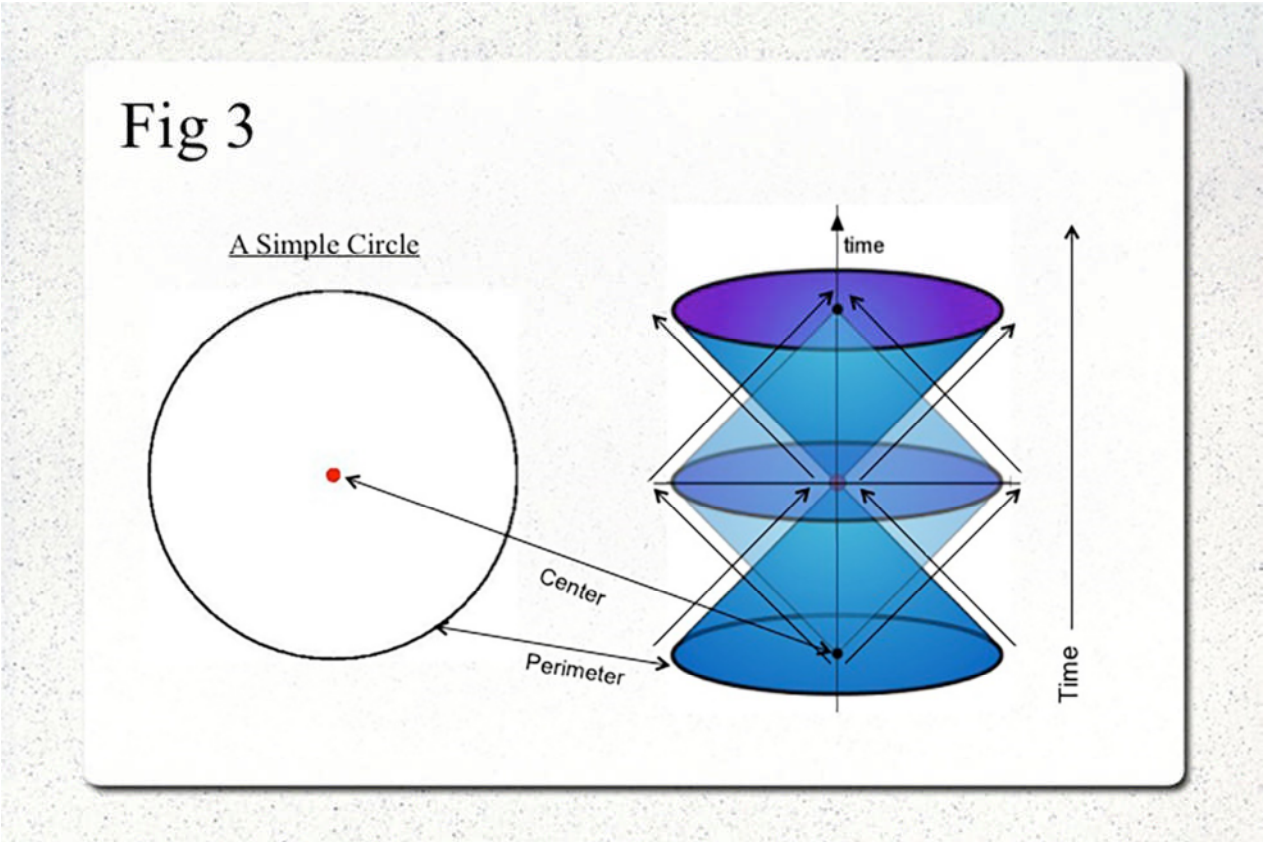
In the Zen model, the formation of an active subjective/objective state is synonymous with a definition of "information" because the creation of such a state is nothing other than the constituent opposites of the system relating to each other in a new way; their new relationship is "information" relative only to the two original sources i.e. within their limits defined by their polarized state. Apart from the new overlap/information formed, the remainder of the original opposites becomes the objective context for that active subject/"information". For example, when a male and a female of some species mate, it's not until their baby is born that they become 'mother' and 'father'. Here, the pre-subjective context, i.e. male-female, is transformed through the birth of their offspring into the completely new relationship we call *mother* and *father*. This new

relationship is completely reliant only on the reality of the offspring for its validity (that is, the parents need not even know of the child's birth). The existence of the child is the only "information" necessary for relative context biological parenthood to be realized. This model is not limited to examples involving causal relationships (father/child/mother, etc.) but lends itself equally well in describing purely temporal distinctions (past/present/future) as well as ~~any other~~ spatial parameters (left/center/right, etc.) .

Regarding examples that involve animate individuation, the two-circles diagram also suggests a simple way to understand *qualia*. 'Qualia' refer to the subjectively accessible, phenomenal aspects of our consciousness [12]. By definition, this suggests that qualia are only perceptible by subjects that have some minimal degree of consciousness as part of their subjective condition. What is it like to actually *see* the color red as opposed to just having complete but second-hand *knowledge* about the experience of seeing red? What is it like to send roots out in the direction of moisture (as plants do)? What is it like to be a bat? To the best of our knowledge, qualia only exist for animate beings, but Is having subjectively experienced the quale of 'seeing red' or 'sending out roots' absolute prerequisites to even begin to answer such questions? I would say, not. However, answers to such questions are necessarily bound to having an accurate model that accounts for the differences between subjective states and how it differs from objective states. What I've presented thus far the Fig. 2 model doesn't distinguish between inanimate and animate entities. Therefore, further development is necessary.

Section 4. A Zen Model for Space and Time

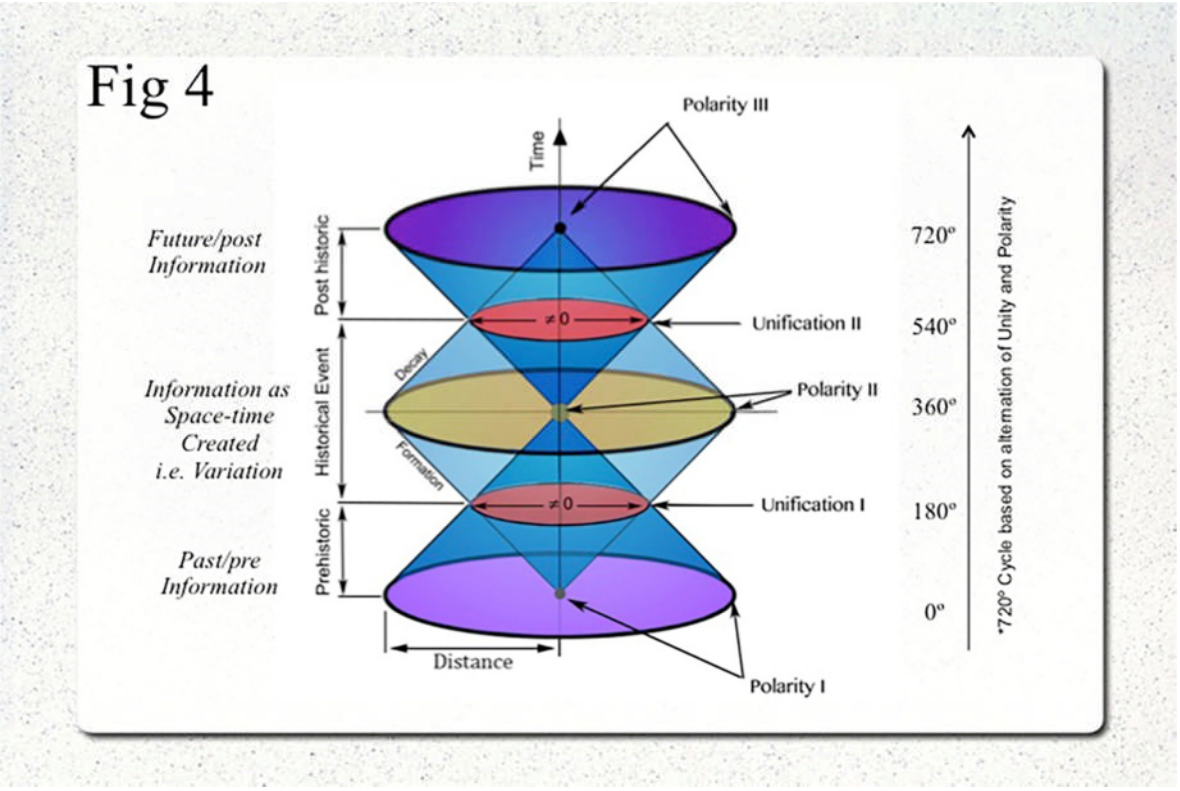
I would like to now present another model that allows for greater examination of the cyclical aspect of the Zen interpretation of Dependent Origination. The diagram (Fig. 3) below shows my own abstract version of the cyclical nature of condition reality based on the Buddhist trikāya as taught to me by my teacher, Joshu Sasaki Roshi [13]. The diagram begins with a simple circle. Let us suggest that this circle represents any single boundary imaginable (i.e. the Dharamakāya). In order to model "change" within the diagram (i.e. Nirmanakāya), we need to define two conditional opposites that model change within/as the shared boundary. We can do this by contrasting its circumference with the center of the circle.



That is, no circle can exist without a center and a circumference (although the dimensions of both are not fixed). Since these two conditional opposites must undergo simultaneous and continuous change with respect to each other, let the center expand outward towards the circumference, and let the circumference contract inward towards the center. During this 'change' there will come a point where circumference and center meet each other. Up to and including this meeting point corresponds to the state in the earlier example (Fig 2) where the black and white circles are completely polarized, i.e. there is no means to draw contrast between black and white except by some outside observer. However, once they have "passed through" each other on their way to the opposite limit, the sharing of content necessary to create an "active" subject/object relationship (i.e. Sambogakāya) comes into being. Eventually, the opposing functions of "expanding center" and "contracting circumference" will reach the origin of their opposing function. It is at this point that the area of "switched functions" reaches its pinnacle of development. That is, the area of overlap has grown to include the total content of the circle and its center. However, even though center and circumference have arrived at their opposing limits, change must still continue. Therefore**,** the only option available is for each to head back towards their original points of origin. The only way this can occur is through the decay of the newly matured relationship between center and circumference i.e. space, that was just formed

through their overlap. This process of *decay* will continue until the two opposing functions again pass through each other at the midpoint of their journeys "homeward", and then finally return back to their original configuration, sans their mutually created "sub-state".

Let me try to unpack this a little bit and related it back to the Trikāya, as well as citing some concrete examples. Quite simply, in Fig. 4, as introduced using the Three-bodies model, we begin with two opposing functions (circumference/center) that define some particular shared boundary/unity i.e. a circle (Dharamakāya). These two functions change with respect to each other (Nirmanakāya) and eventually switch their original orientations to each other. This switch creates a new kind of relationship between the opposing functions i.e. an "active-subject"/object (Sambogakāya). This new "relativistic" spatial condition will grow and mature until the opposing functions reach the origin of their opposite function. Then, that created space will begin to decay, as the opposing limits begin to move back towards their original points of origin. Once the returning functions meet and cross back into their original orientation of circumference and center, the "active- subject"/object relationship is destroyed.



Just as in the two-circle example (Fig 2), there is a "pre-informational" state that evolves into an "informed" state that evolves once again into a "post-informational"

where the “information” gained is again completely dispersed.

In the case of the birth of a human being, human beings are a single species that is (essentially) divided into male and female. Each of us was born by some male and some female interpenetrating and unifying in such a way as to create a new conditional subject made up from the original pair. From our perspective as children (subject), we come into being together with our parents (object). We grow by feeding off the resources provided to us by our parents, as they themselves decay through the very process of nurturing us. At some point**,** the child’s parents die, bequeathing the last of their resources to their progeny in order to bring to full maturation the individual/child. Unfortunately, each of us (i.e. child) must then in turn relinquish those resources in various ways as we ourselves decay. Eventually, the child decays and once again (after death) becomes indistinguishable from his/her surroundings. Of course what happens after death is also a question worth pondering in light of this model, although time does not permit a full treatment of this topic.

Excursus (1):

Some readers might remark that Fig. 4 resembles the well-known *Minkowski light cone* diagram[(14)]. Although I am aware of Minkowski’s light cone model, I created my Zen-diagram as a way to illustrate the evolution of a “subjective state” in a time-space-like format. My intention is to present a *purely psychic* (for lack of a better word) view of subjectivity via the lens of Zen Buddhism. Therefore, I should mention that this graphic must be ***clearly differentiated from the pure physics*** of Minkowski’s model.

The above diagram of the Zen cycle of change lends itself to being described as a 720° cycle. That is, if the transition from a pre-informational state (polarity I, Fig. 4) to a state of relative unity (Unification I, Fig. 4) can be described as a 180° “phase shift” (i.e. unity is the perfect opposite of polarity), then the creation of a “switched polarity” i.e. mature active-subject/object (Polarity II, Fig. 4) would be complete after the first 360° of the cycle. Of course, the diagram goes on to show that it takes a second 360° cycle in order to model a second unification and return of the polar opposites to their original configuration (see Fig. 4). This 720° description of the diagram introduces the next topic for the talk: complexity.

Section 5. Complexity

Earlier in the paper, I mentioned that qualia seem to be limited to animate beings, yet all of the preceding diagrams I've presented can be used to describe either animate or inanimate active-subjects. How can we model the essential difference between the the animate and inanimate states? Is the reality of a stone different from the reality of a human being? It is said, that given enough monkeys, typewriters, and time, that at some point in eternity, one of them will randomly type a complete version of Shakespere's *Hamlet* [15]. However, there is no chance of this happening for an unlimited number of bathtubs and typewriters. Why? What we've shown is that using the Zen interpretation of Dependent Origination a general model for the conditioned nature of subjectivity and objectivity can be described using a few simple diagrams. What I'd like to do now is to present a model that provides a way to represent four very different but obviously related expressions of reality to show that their differences are the product of their relative contextual complexity, rather than from inherent qualities (subjective bias) or emergent characteristics (objective bias). Of course, I am no scientist and the following isn't meant as anything other than a philosophical *Gedanken and Ideen* showing how Dependent Origination (via the Trikāya) might be used to represent different phenomena and their interdependence. The list of four states in no way implies that it is exhaustive of all possible expressions of complexity, but hopefully these four can serve as an interesting beginning.

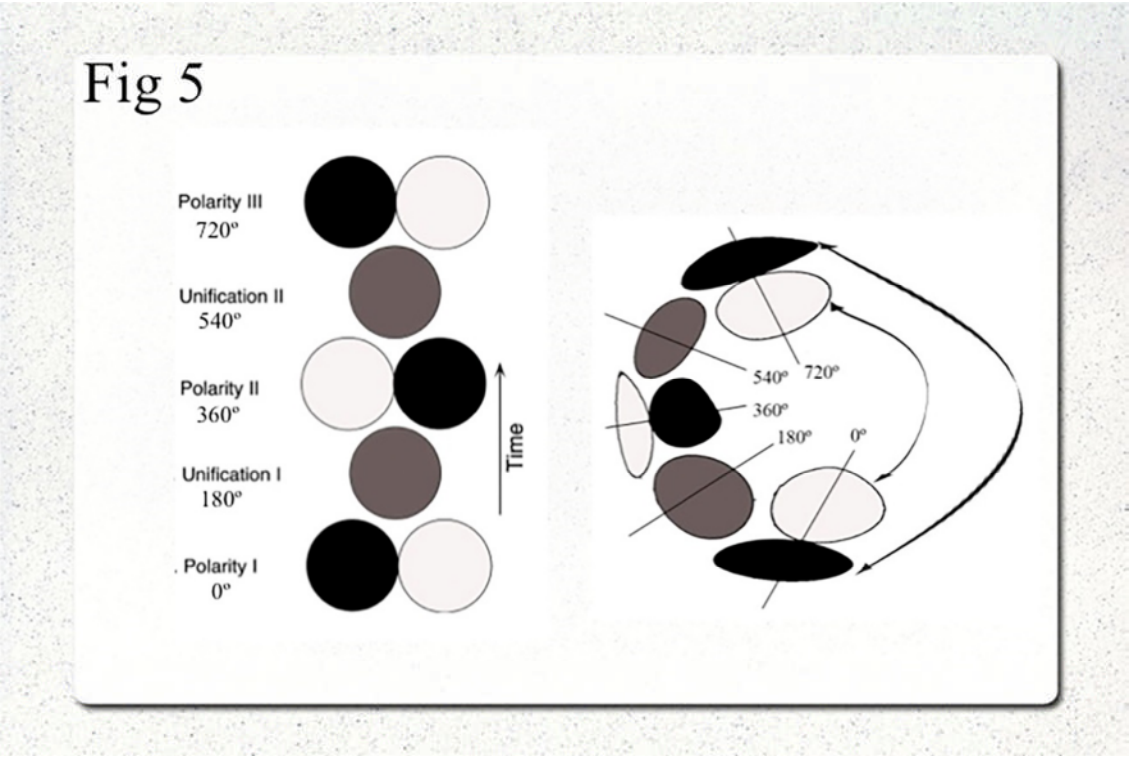
Those four expressions will be:

1) *Massless entities in super-position* (as the simplest ontological manifestation of the Trikāya)

2) *Massive entities in super-position* (as the next level of ontological complexity manifestated via the Trikāya)

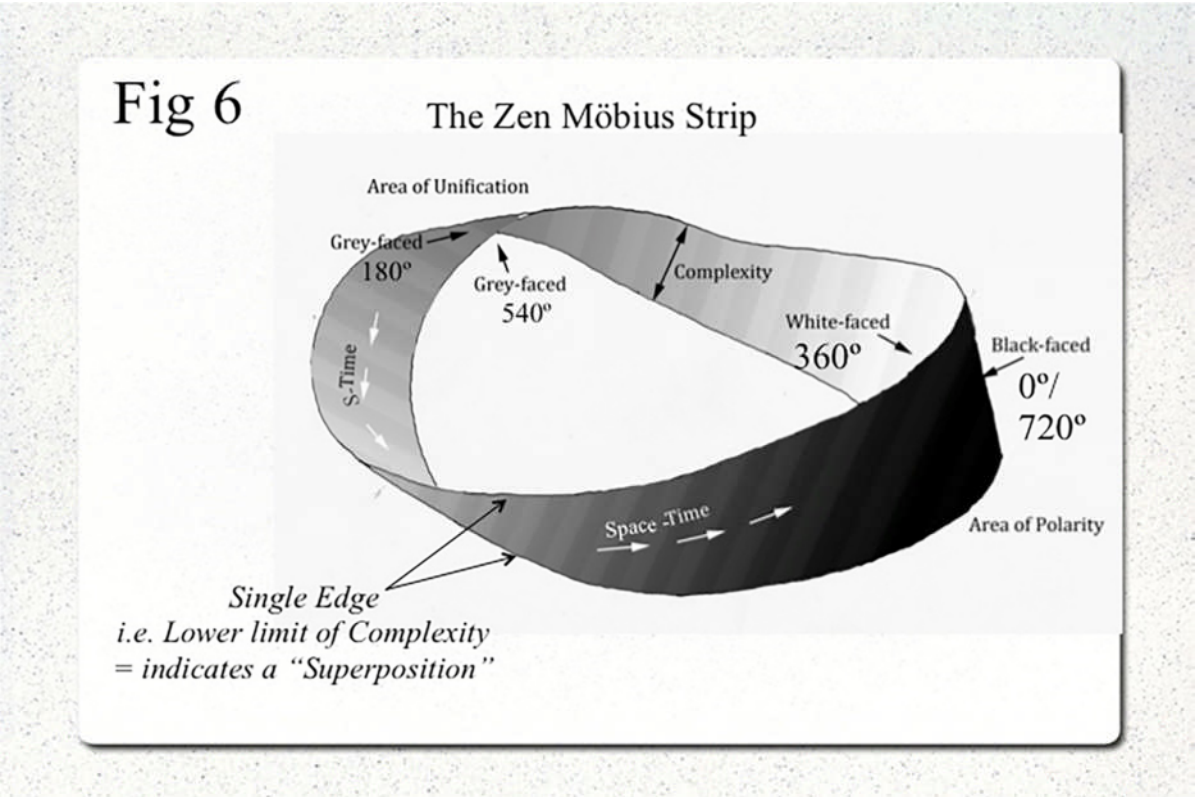
3) *Inanimate classical level entities* (localized manifestations of the Trikāya)

4) *Animate classical level entities* (localized manifestations of the Trikāya capable of consciousness, i.e. animate beings)



To begin to develop this model I'd like to further abstract the cyclical process presented in Fig. 4. In the above diagram (Fig. 5), we see oscillation between polarity and unification expressed as simple black white and gray circles. Of course, this diagram only shows a single 720° cycle. In reality the cycle endlessly repeats…continuously creating new completely conditional expressions of space with/as every moment of time. If we take the black and white diagram of the Zen cycle of change and join pre- and post-event polar states, we get a continuous 720º loop. Of course, this simply expresses the experience that the end of one moment of time is simultaneously the beginning of the next. Most importantly, this 720º loop is topologically expressible using a simple Möbius strip. The Möbius strip has only a single edge and one side but in cross-section, that one side can be divided into two conjugal *faces* at every point along it.

To exactly mirror the Zen diagram for change, the functional oscillation between unification and polarity must also be represented on the strip, i.e. the two conditional

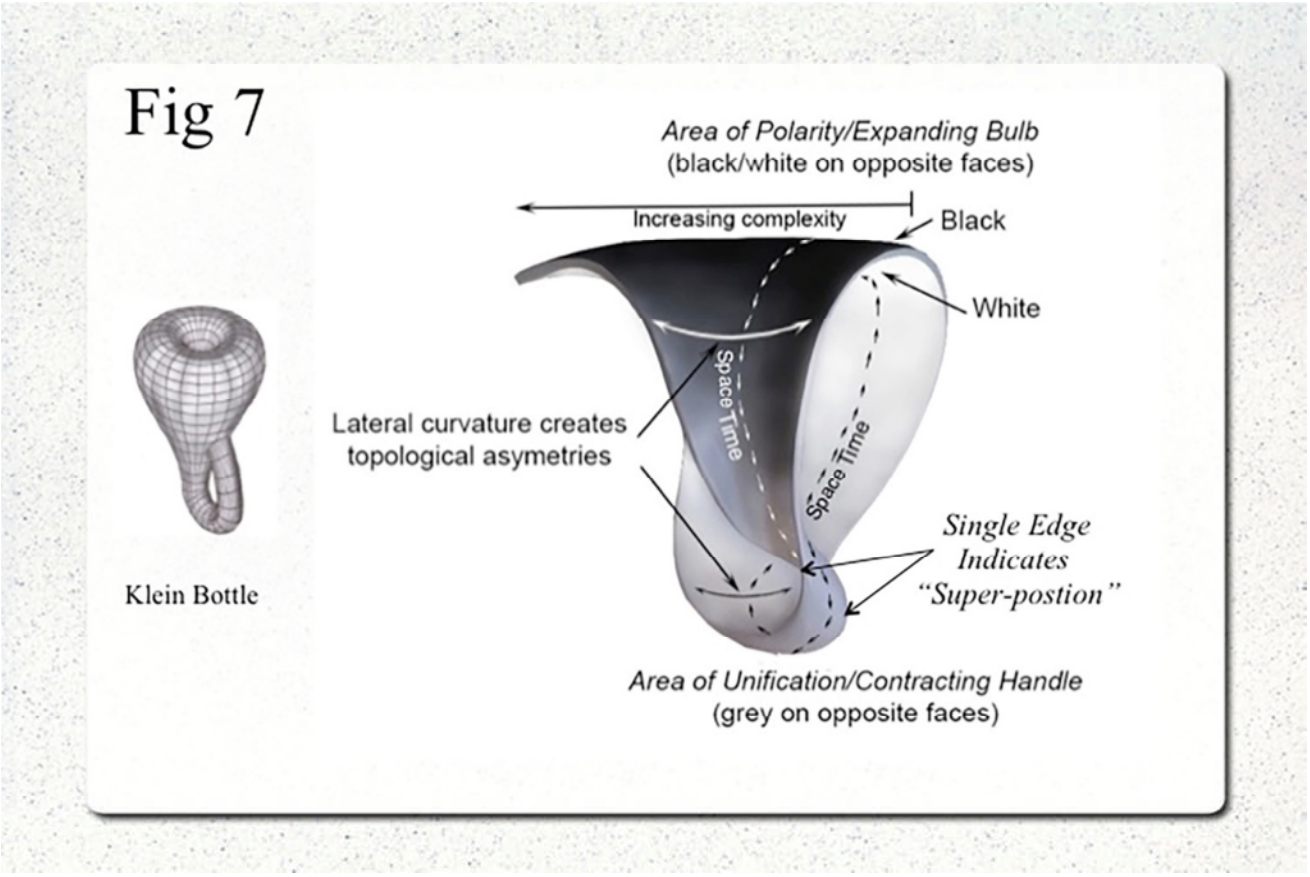


faces (opposites) need to reflect an oscillation between a state of perfect polarity and a state of perfect unity. Therefore, at some point along the strip, let one face be completely black and the other white (Fig. 6). In the area 180° from this black/white area, let both faces be perfectly uniform gray. Let the area between the black/white faces and uniform gray gradually transition to each other. Because it takes a 720º progression along (i.e. two times around) the face of any Möbius strip to return to ones starting point, if we begin on the point of greatest polarity oriented towards the black face, it will take a 720º progression to return to that same black/white orientation, but in so doing, the orientations of black, white, and gray will have cycled through the unification and polarized "switching"**;** in perfect keeping with the Zen diagram for change (Fig. 5). This also reflects the Trikāya in that any single boundary (Dharamakāya) i.e. the total Zen Möbius strip, is internally divisible into two purely conditional and changing opposites i.e. black and white to grey (Nirmanakāya), giving rise to some shared condition created between them (Sambogakāya). In all the topological examples to follow, the longitudinal dimension will represent the change of whatever system of opposites is being modeled, while the latitudinal dimension will represent its relative degree of complexity.

In the Circle-Center diagram (Fig. 4), the subject/object (Sambogakāya) is produced as the new 'space' created by the switching circumference and center. However, in the

case of a progression along the Zen Möbius strip (Fig 6.), there is no actual new spatial distinct area created beyond the switching of conjugal opposites via the progression along the Zen Möbius (ZMS). That is to say, as the opposites “switch” there is no active -subject created *between* them. Rather, the active-subject manifests *as* the changing relationship of the switched opposites as they polarize and unify with each other. Thus, at the simplest of levels, that relationship can be as simple (and awesome) as a single massless particle in a direct relationship with the rest of the Cosmos. It is this special one-to-one relationship with the cosmos-as-a-whole that might help describe the basic nature of super-position in via the Trikāya model. It is this direct, non-intermediary type of relationship (i.e. a wave-function) that characterizes both of the first two orders of complexity in the Trikāya model.

The basic Zen Möbius strip (Fig. 6) just described is how I model the ***first-order of complexity*** from the list of four that I mentioned earlier: *Massless entities in super-position* (i.e. the simplest manifestation of the Trikāya schema). How then to model *Massive entities in super-position* (i.e. the next level of ontological complexity described via the Trikāya schema)? In order to illustrate this ***second-order of complexity*** we must not only begin to increase the width of the strip, but also include the addition of a lateral curve (Fig. 7). This greater width and lateral curve are not arbitrary. Rather, it defines the second level of complexity in the evolution of the Möbius strip topology towards that of a Klein Bottle (image on left side of Fig. 7). Like the Möbius strip, a Klein bottle is also a two-dimensional manifold embedded in three-dimensional space, but unlike the Möbius strip, the Klein bottle has no edge (more will be said about this evolution in the paragraphs below).



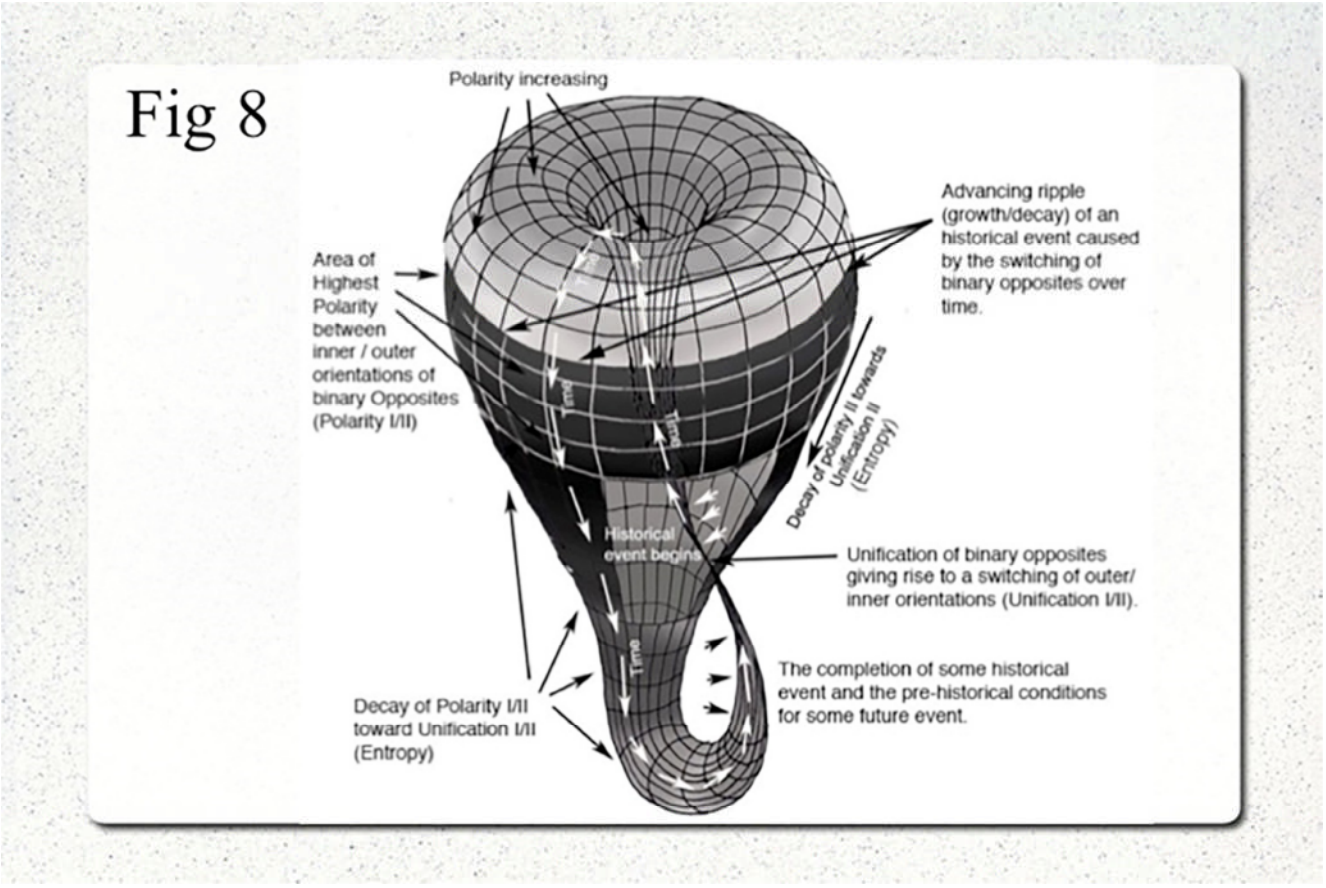
Excursus (2):

Here I should state that the following explanation uses the special topology of Felix Klein, the so called "Klein bottle", created using two dimensional geometry that can be schematized into Klein's special bottle figure. Even if I draw upon F. Klein's bottle, my purpose is not to investigate the purely geometrical aspects of Felix Klein's topology. The sole focus of my paper is try to create a way to model complexity using a Zen Buddhist interpretation of Dependent Origination via the *Trikāya*.

Once we begin to add a lateral curve to the first-order ZMS, a second-order complexity is formed and some interesting things happen. What we find is that the width where black and white are polarized becomes wider, while the gray area becomes narrower (see Fig. 7). Conversely, The degree of lateral curvature increases in the area of unification (where opposites unify) and is less where the opposing faces are polarized from each other (as black and white). Again, time does not permit a thorough explanation of this, but suffice to say that it is due to these new topological asymmetries over the 720º cycle (compared to the first-order flat and "symmetrical" ZMS) that mass and gravity come to characterize the active subject/object

(Sambogakāya) “conditions” that arise.

In the Zen model, **the *third-order of complexity*** is illustrated as a modified Klein bottle (i.e. Zen Kline Bottle, see Fig. 8). In contrast to the first two orders presented, this topology depicts a conditional relationship that has no edge. This means that the system represented does not exist at the lower limit of complexity, i.e. not as a quantum-level superposition created by the two polar functions of the shared boundary.

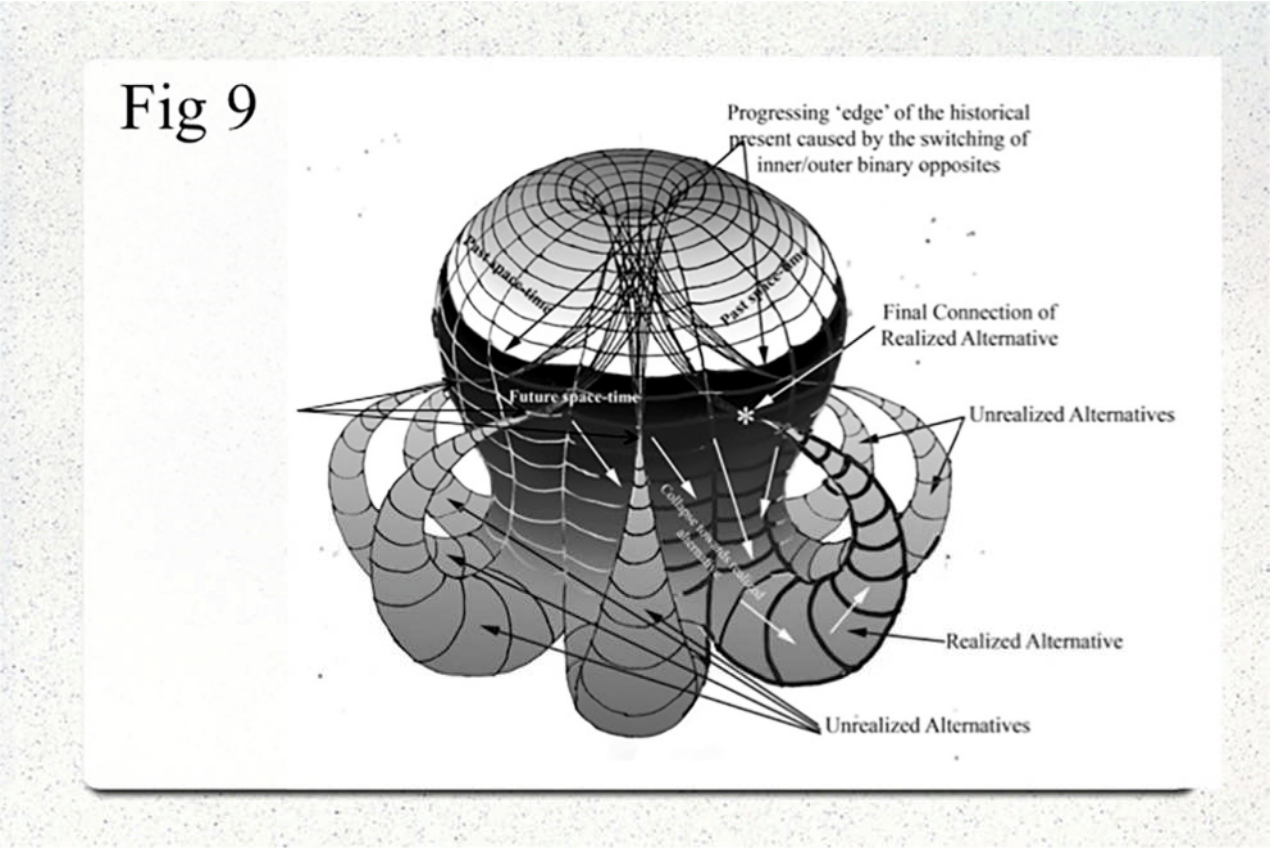


Rather, thirdorder expressions are localized, purely physical or material relationships embedded and unfolding *within* the greater context of some lar ger shared boundary. Therefore, relative to the first two-orders, the exact point where a first or second order transitions into a third-order complexity can be thought of as that aspect of my interpretation of the Trikāya schema corresponding to a *collapse of the wave-function*.

Diagrammatically, there are unique differences between the Zen Kline bottle (ZKB) and a normal Kline bottle. But as one might imagine, the function represented by the cyclical oscillation between black, white, and gray areas are also applied in a similar way to the ZKB topology. One of the most important additions to the function of the Zen Klein bottle is that at the point where both faces are perfect gray, the narrowing diameter of the handle of the bottle (gray area) actually collapses to a point of contact

between the inner and outer "faces", then inner and outer faces (black and white) pass through and actually switch sides. This creates the "advancing ripple" of the historical event as "black events" and "white events" alternate with each other over time (See Fig.8). Essentially, we've returned to modeling the active-subject as a created sub-space embedded within the context of the remainder of the two polar opposites. By contrast, as stated above, there is no such changing space created between the opposites in the first two orders of complexity (see Fig. 6 & 7). This lack makes super-position and *entanglement* possible for the first two orders and largely impossible (with qualified exceptions) for the third. That is, even when the first/second-order particle is itself divided, there is no "distance" separating the entangled half-particles from their conjugal opposite, e.g. both entangled halves of a particle are still in direct contact with the rest of the Cosmos (or the entirety of their conjugal opposite). This we observe as "instantaneous action-at-a-distance" [16]. By contrast, every third-order active-subject is characterized by having a spatial and temporal context, i.e. they have a particular past, present, and future. This added level of complexity imparts and inherently different ontological character to the third-order active-subject, one that cannot be maintained if is divided into two halves and separated by some distance.

The ***fourth-order of complexity*** (Fig. 9) is distinguished from the third-order in that its active-subject has the unique capacity to generate and pursue alternative ways of evolving as-and-through its own objective/contextual surroundings. Perhaps another way this can be expressed is to state that all animate entities exhibit problem-solving *behaviors*. Each possible alternative, whether expressing an actual physical or purely hypothetical "connection", can be thought of as a *tool* through which the progressing "wave" of the active-subject/object relationship can make its next connection, aka: unification (See Fig. 4, Unification II). Therefore, on the human level; thoughts, motives, society, parents, friends, morals, mathematics, stairs, even the internal organs…any and all of the possible interactions that a human could possibly make, can be all understood as "inner" and "outer" tools (i.e. alternatives) through which we generate i.e. conceive of (either consciously or unconsciously [e.g. via DNA]) ways to continue to evolve through-and-as fourth-order expressions of space-time. That is, we can make the next moment about, physically growing (unconscious), mentally focusing on a bit of philosophy (conscious), or chewing and swallowing a bit of beef (both conscious and unconscious). We can even "choose" to do all of the above simultaneously!



Essentially, the fourth-order diagram is a topological modeling of qualia. That is, all alternatives, realized or not, contribute to define both the ultimately manifested alternative for the active-subject as well as contributing to the content of the next active-subject that necessarily will polarize from its surroundings as the result of the Zen cycle of change via that chosen alternative. Every animate subject behaves similarly, though levels of complexity vary greatly within the fourth-order. However, I do believe that Fig. 9 can be considered a model for all, regardless of the complexity of their actively subjective element qualia (although simpler expressions will have fewer "arms" i.e. alternative ways to connect). So, in response to Thomas Nagal's famous question: "What is it like to be a bat?" [17], on some fundamental level, we do in fact, know what it's like to be a bat…or a worm…or a plant, as humans and all animate beings derive their own experience-of-subjectivity in exactly the same way.

Through the generation of alternatives, fourth-order expressions literally give rise to an utterly new form of reality…one that incorporates simpler orders of complexity into its own ontology and welds these into a new domain of reality: into its experience. Things

as seemingly diverse as romance, quantum physics, and music all come into being. This fourth-order domain is no mere virtual world, as the physical nature of the lower orders can be physically changed by an encounter with it. This is clearly exemplified in the Zen interpretation of the Double-slit experiment, where a photon in the first-order (quantum state), is transformed from a first or second-order complexity into a fourth-order expression (i.e. an observation) through the mere act of some fourth-order tool detecting it (a scientist and her observation equipment). I've written more extensively about this in a book entitle: *The Zen Interpretation*, available on Amazon.com.

Section 6. Conclusion

The fourth-order diagram (Fig. 9) and description of consciousness differs radically from brain-only or emergent (*physicalist*) explanations of consciousness because the fourth-order includes everything that is other-than-brain/body as an equally necessary partner in giving rise to any active-subject/context experience, i.e. moment of subjective consciousness. That is, the brain is no more or less important a tool for creating subjective consciousness than air, food, water, or gravity, etc. Remove any of these, and the nature of that subjective consciousness must change. Yet, also in contrast to the *panpsychic* view, the Zen interpretation suggests that the distinctions between animate and inanimate entities are clearly defined. That is, not everything "has" subjective consciousness, in the same sense that animate beings do, and yet all the cosmos is somehow equally participating in a shared, beginningless and endless "activity". In Zen Buddhism, this activity is called the "Dharma Activity".

Ultimately the Dharma Activity cannot truly be described by words, as it is that which makes up the content for all aspects of that which can be called 'reality': at any and all levels of complexity. Human life, intellect, and emotions are all themselves nothing but magnificently complex expressions of this same Dharmic "algorithm". Ultimately, learning to manifest the Dharma Activity on the human level leads to experiencing ourselves not as objects in a universe of objects, but rather as the ever-changing and subjectively-active relationship between the totality of our insides as well as the totality of our outsides…as well as all the alternatives (see Fig. 9) we could possibly conceive of or interact with. In Zen, the manifestation of this principle by human beings (and all beings) is described simply as the unselfish practice of *giving* and *receiving* (Sanskrit; *Dana*), of embracing and being embraced. Therefore, If I were

pressed to suggest a one-word description for this unselfish-changing-at-every-level-of-reality, it would be simply; LOVE, in the most universal and direct sense possible. We live in a universe constructed and maintained solely and exclusively from the activity of Love itself. There is nothing else, because nothing else is needed.

In summary, I have presented a Zen interpretation of Dependent origination as a way that offers a description of what might be called the fundamental "Activity" of Nature (i.e. Love) as well as a simple way to model the diverse complexity of Nature, from its simplest expressions up to and including the highest achievements of human consciousness.

(Edited by the Board of the *KoPhil*,
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Rev. William Kigen Ekeson
(Monk of the Zen Buddhism of the Rinzai Tradition
Mt. Baldy Zen Center, Los Angeles)
kigen01@gmail.com

Concerning the Concept of Nature in Chinese Philosophy

Werner GABRIEL (Vienna/Austria)

The concept of nature in the European tradition sways between two meanings. On the one hand it means everything that is, world, on the other hand the world which is not created by man, which he finds already existing when he steps into the world. This problem can be found in the Chinese tradition as well. A specific European problem compared with the Chinese tradition arises in a third concept of the world which plays no or not an important role in China. This third concept is formulated proverbially in the formula "God and the world". World is called the immanent opposite to the transcendent. These different elementary concepts are connected in varied relations. So the third concept approaches to the first if the totality of being is divided in creative and created nature (natura naturans and natura naturata). Natura naturans has a tendency to be considered as essence and power of man, which can be found beyond nature to reach control over nature. This concept approaches to those Chinese concepts which think highly of the differentiation of the natural world from the artificial world of man.

Seen from the point of view of the European tradition, the dominating and probably oldest Chinese concept of nature can be seen as an abolition of the difference from natura naturans and natura naturata. Nature is seen as eternal production which is renewed permanently. So producing appears as basic character of nature, nature exists in different manners of production. Here might be found a part of the answer to the much discussed question why in China the takeoff towards modern natural sciences and technology was missed. Except many cultural, social and political reasons there can be seen a basic difference in the view of nature which gives quite another direction to the development, even if the Chinese tradition was able to anticipate many modern inventions.

> "The Book of Changes is a book far reaching and large,
> in which everything is completely included. It is the dào

> of heaven it, the dào (道) of the earth in it, the dào (道) of man in it..."[160]

There are three creative powers: Heaven, earth, man. Heaven and earth can be understood as the whole universe and the condition of its production. It is remarkable that man is recognized in the row of these creative principles with equal rights. Man is not a creature, but creator, principle, original condition of many realities which can be found in nature. This means the products of human technical skill, and the condition of its productions as well, including the human society. These products don't differ from products of nature because they are just found likewise in nature. The universe admits them as products. Hence, they are in the same way parts of nature.

They are necessary parts of nature as well. Without their contribution nature is not in balance. Hence, man has to pay attention to heaven and earth and not disturb their delicate balance. Man is an equivalent partner of heaven and earth, he performs with them constantly a political dialogue which separates the interests and protects in mutual relation the continuance of the whole.

> "It [the Book of Changes] summarises these three basic powers."[161]

In this sight the origin of the political character of the Chinese philosophy can be found. This is social interest, not in a narrow sense, but in a certain view of the structure of the cosmic events. It is quite clear that this basic structure forms the view of science too, the methodical-rational discussion with nature.

On the other hand, the differences in the concept of science in China and in the West are concentrated in this role of man as "a divine", creative principle on the one hand, and the view of man as a specific product of a divine creator.

Another result of this immanent concept of nature consists in the fact that being receives generally a radical temporal character. The change, conversion, determines what nature is. Nature is everything which appears; beyond the phenomenal world there exists nothing.

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[160] I Ging Da Dschuan II 10 1

[161] I Ging Da Dschuan II 10 1

This basic regulation of that what exists as permanent change is expressed later on in the double concept of yīn yáng (陰 陽). It is important to note that these two "ethers" (qì 氣) may not be understood as ontological principles in a dualistic system. They describe nothing else than the change, conversion, the transition and have no substantial character. Every phenomenon is on the one hand yīn (陰) and, on the other hand, yáng (陽). The unity of nature arises just from the constant change. The phenomena exist in their conversions. Interruption of this process means demolition of the change and the end of existence.

"A yīn (陰), a yáng (陽), this is dào(道)."[162]

Therefore concepts of unity as dào (道) may never be understood as everlasting principles. This absolute is not accidentally called dào, way. A way exists in the constant change of walking. In this context another characteristic feature of the Chinese concept of nature has to be mentioned. Truth means always to keep open the way, never achievement of an end. Hence, it is radically anti-teleological.

The important role of man in nature arises from the fact that he is able to open new ways to nature if he does not try to end the way in regularities and regulations.

When nature is determined with an uniform concept, like "qì (氣)", "ether", this change is meant as well. The basic character of the ether is condensation and scattering .It does not exist in a basic material unity which is divided later on into the yīn (陰) ether and the yáng (陽) ether.

The famous five elements are forms of movement too, effects of different quality and not fundamental material units. They mean modes of transition too.

Concerning the fact that nature is understood as universal dynamic event an astonishing consequence arises. Just because the Chinese tradition has a radically phenomenal view of nature, the natural events themselves are not visible. The firm phenomena are not that what happens in nature. They have to be interpreted as movements. So the interpretation of a line of the hexagrams in the Book of Changes moves to the next line. In this movement of understanding the concealed movement of the phenomena is revealed.

[162] I Ging Da Dschuan I 5 1

In this way the epistemological meaning of the trigram and hexagram which is not at all evident can be revealed. So the legendary king Fuxi can say that the possibility of knowledge of the world was opened to him by the tortoise that carries eight trigrams on her shell.[163]

The chaotic variety of the phenomena becomes accessible to him as a way of change.

It is quite right to say that from these circumstances another view of the laws of nature arises. Not the permanent certainty in an equation is searched, but rules of change, you could say the rules of the irregular.

You can be find a lot of pictures proving this evidence

> "If the sun goes, there comes the moon. If the moon goes, there comes the sun. The sun and moon alternate, and so the light comes into being. If the cold goes, there comes the heat. If the heat goes, there comes the cold. Cold and heat alternate, and so the year is completed. The past contracts, the future extends. Contracting and expanding influence each other, and so production comes into being. ."[164]

In this citation time itself is determined as conversion. The past changes into the future. The present time is contraction, the critical moment of transition which must succeed, so that nature can continue. This is its way to go on.

It should be mentioned at this point that the Book of Changes has its origin in a prognostic interest. It serves – until today – as oracle. Hence, the central dimension of time is the future and the right way that which ensures a good future. The Book of the Changes deals with the problem, talking in a sensible, reasonable way about future, without divine inspiration. Future consists in the fact that it is not the past. So it must be recognised how the dangerous transition from the past to the future can be accomplished successfully. The basic condition is the acting man himself. Man forms the future in connection with the actions of heaven, earth and the people whose effects

[163] I Ging Da Dschuan II 2 1

[164] I Ging Da Dschuan II 5 2

must be estimated in prognoses. A successful action arises from the right evaluation of this action-network. Then there will exist a future world which can pass.

An interesting question arises: Do you find here simply an anthropomorphism? Heaven and earth are understood as an action-network. In this respect they are manlike. But they have different structures and are just thereby distinguishable as creative forces. Indeed, they are constructed in a way that they are open towards each other. Only in this way world is possible, above all the miracle is possible that man can exist in this world. This question leads us to the important hint that conversion cannot be seen as a process-like, automatic order of events. It is not consistent and computable, but must be produced in every moment, mostly by overcoming obstacles.

In nature only the unexpected can be expected. So the virtue of carefulness is not only an important rule of etiquette, but also a methodical condition of knowledge.

The universe is a completely dynamic structure. It exists only as long as the dynamism is maintained.

Hence, if this view of the world is criticized in ancient China, this criticism does not have a direction which criticises its lacking of stability and security. A certain lack of consequence is found on the contrary in a too great reliability in the creation of the natural "laws“. A contradiction with the basic acceptance of the constantly changing dynamism is found there.

In this sense the philosophical Taoism draws the radical consequence from this traditional beginning. He criticises the wrong stabilisation of nature in human recognising. Hence, a break is located between the true being of the nature and human recognising. This break marks at the same time the break between civilised humanity and nature. In his recognition man builds a distance to nature which he wants to overcome with the help of the hexagrams. The dynamic of nature is so radical and variable that even the loosest application of rules must fail. Nature is expecting too much from man .So he constructs the civilised counter world in a consciousness of offended arrogance.

The instruments with which the civilised humanity wants to make the nature accessible are the "names" (míng 名). With the names stability should be given to nature, with their help nature should be brought closer to man. But names miss nature

just in its fundamental structure, namely in its changeability. Stability is no quality of nature.

> "The firm names are no names which are long-lasting."[165]

The duration itself is unnatural, just because it is the pride of man who finds in it his special human quality. Hence, the names do not open the way to knowledge of nature, they prevent man from finding an access to it. Hence, one must remove above all the rubble of names to win access to nature.

How does a nature look like which is settled beyond the names, and how can it be opened to man?

> "Man follows earth, earth follows heaven, heaven follows dào, dào follows nature [zìrán 自然]."[166]

The main problem in this citation lays in the term zìrán which is used here for nature and which is fundamentally untranslatable.

Zìrán means on the one hand nature, on the other hand, spontaneity, freedom.

In this seeming problem of translation the difference between western and Chinese interpretation of nature can be viewed in its whole strictness. Nature, that means the single phenomenon in nature, is radically free. The phenomena come and go as they want. Subjected to laws is not nature, but man because he tries to free himself from nature. It is him who is submitted to laws because he wants to force laws upon nature. Laws are fundamentally in opposition to nature. Hence, man can become only free if he follows nature. He is able to do this if he follows his uncivilised, precivilised nature. The phenomena of nature follow each other, move, express themselves without speaking, simply exist. This recognising of the taciturn character of nature is also found in Confucius too. Once he wanted to repulse the obtrusiveness of his pupils:

> “The master said: ‘I would prefer not speaking’ Tsekung said, ‘If you, master do not speak, what shall we, your

[165] Daodejing chapter. 1

[166] Daodejing chapter. 25

> disciples, have to record?' The master said, 'Does heaven speak? The four seasons pursue their courses, and all things are continually being produced, but does heaven say anything?' "[167]

Heaven expresses himself without using naming words. He is creative because he acts and does not talk.

We understand the statements of heaven without using words. Actions themselves are signs. These are true because they do not use any force against the phenomena, they can follow the changes because they are nothing else than these changes. It is even more important that man can become a natural being only if he does not use names and adjusts himself to the stream of the phenomena, follows them. Hence, to recognise means to diminish the rubble of civilisation, the institutional naming .

However, with this action man becomes a natural being as well, i.e. a being without nameable identity.

Zhuangzi believes even that this ability of changing is given to man to an especially high degree.

> "The fact that we are formed in human shape, is reason for a great delight; the fact that the human figure goes through thousand changes without coming to an end, this is an overwhelming bliss."[168]

The mortal sin of civilisation consists in the fact that it takes away from man this capacity of boundless change and assigns to him social roles which he cannot escape from. With Confucius the names serve to distinguish social roles.

> "Good government consists in the fact that the prince is a prince, the minister a minister, the father a father and the son a son."[169]

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[167] Confucius Analects XVII XIX

[168] Zhuangzi VI

[169] Confucius Analects XII XI 2

It is important to add that the Taoist concept of nature has a scientific, or, in any case, a methodical character. The liberation of man does not occur through a sudden enlightenment, but through methodical working off of the rubble of names.

> "The other side [the contrast fǎn 反] is the strength of dào. Getting weak is the means of dào. In the world all things are born by being, being is born in nothing."[170]

Whatever may be meant by the taoistic nothing, it means in any case that the essence of things is found beyond the names. They cannot be named and may not be named.

This radical concept of nature takes with Xunzi (Hsüntse) a surprising turn. Xunzi accepts the taoistic concept of nature, but he joins the side of civilisation. He concludes from the existence of names that just because of their existence man is not a natural being. He is radically different from heaven and may not follow it if he wants to exist as man. Hence, he criticizes the Taoists because they force man to follow nature.

> "Zhuangzi fears heaven and does not know man. If one speaks from the point of view of heaven about dao it means that dao exhausts itself in following,[171]

Xunzi gives another interpretation to the three creative forces of the Book of Changes. He means just because these forces are independent the world of man cannot be derived from heaven. He should not put the focus of his interest on heaven. Man is released with Xunzi from his cosmic job

> "Instead of looking to heaven and thinking about it, why not accumulate wealth and use it advantageously? Instead of obeying heaven and adoring it, why not adapt heaven and make it useful?"[172]

In connection with this subject you can find a question which belongs to the mostly discussed in ancient China. Is the nature (xìng 性) of man good or evil? The original

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[170] Daodejing chapter. 40

[171] Xunzi 21

[172] Xunzi 17

social structure of man is called good. Is the nature of man originally social, open to his fellow men or is it necessary to build in addition a superstructure of civilisation? Confucius and Mencius accept a natural social nature given by heaven which can be unfolded in society. The independence from heaven leads Xunzi to the opposite thesis. He comes to a very simple, but impressive definition nature.

> "That what at the moment of its birth is as it is one can call nature (xìng 性)."[173]

Nature is a matter of heaven and has nothing to do with a specific human nature, it is animal, led by instincts

> "Man loves at the moment of his birth his advantage... Man is envious after his birth and full of hatred... After his birth he owns the desires of the ear and the eye and loves tones and women..."[174]

The social nature of man is completely artificial and is managed by education under instructions of a good government.

With Xunzi another concept plays a role too which serves later for the name of the natural order:

> "Without the sage heaven and earth would be without order (lǐ 理)."[175]

The concept of lǐ (理) means first of all ritual, juridical order. With Neoconfucianism (from 10. to 13.Cent.) it means law and order of nature. Now this order should protect the reality of nature. It is now necessary to prove the positive reality of natural order in discussion with Buddhism which had denied the reality of the phenomenal world making it illusory.

In this discussion the central Buddhist concept of emptiness is given a physical character. The "Great Void" is not empty, but exists in form of an invisible, fine

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[173] Xun zi 23

[174] ibid.

[175] Xunzi 9

material structure which is called ether (qì 氣). In an everlasting circulation the things originate and pass from compression to dispersion. With it the question about the possibility of science becomes relevant once more because it has to become clear how this order of events could be uncovered in detail.

This concept is developed from an absolute zero point. Hence, the natural order exists with Changzai (1020 - 1077) in nothing else than the fundamental condition of development and passing away, on the order of time.

> "In the process of the forming some things come first and other later. This is the order of heaven. In the connection of the shape-like things some are small and some big, some on top and other below. This is the order of heaven. The production of the things by heaven has its chronological order"[176]

The chronological order has itself already a qualitative character because the order can be expressed only by the difference of the appearance.

> "Although the condensation and dispersion of the universal ether runs after hundred different ways, the principle (lĭ 理) of its actions is ordered“[177]

The stress on the reality of the "outside world" against Buddhism leads to the fact that Chinese science gets an emphatically qualitative character in which the subtle differentiation of the phenomena plays the leading role.

Basically the intention of research approaches again to the Book of Changes, also because the yin yang pattern plays a dominating role again and is carried out in a larger theoretical precision. This school founded by Zouyan in 4. B.C. has been completed with the pattern of the five elements which allows a greater exactness.

The methodology of this beginning of a philosophy of science has to be considered very carefully because one could easily come to the opinion that its concepts are fixed in a complete arbitrary way. This would be the case if you separate the patterns of

[176] Chang Zai 5 3.2

[177] Chang Zai 1 2.3

their empiric basis. However, these patterns only try to follow the way of experience. Experience is differentiation. The discerning classification of the phenomena in a differentiated and more and more subtle differentiation is the method of scientific research on a rational basis which differs from magic methods. With this principle of the subtle differentiation a critical principle is found at the same time that consists in reaching a differentiation becoming more and more subtle and in avoiding coarsening flattening in identities.

> "Heaven has yin and yang, just as man... Their dao is one. Those who are aware about that know that the yin must be activated if it should rain... If it should stop to rain, the yang must be activated... Hence, there is generally no reason to suppose something miraculous about the causes of the rain, although his reason (lǐ 理) may be hidden."[178]

It is in any case clear that with these leading ideas a scientific claim is raised. As long as a pattern is formulated only in an abstract way, it has no meaning at all because the assignations to yin or yang may be arbitrary. The more fully, however, the board is filled by differentiating observation, the more exactly become the assignations.

However, to find these assignations is only possible if in principle the whole universe is a field of relations.

Therefore still another basic element of scientific research in the west is rejected besides the excessive use of mathematics, the scientific experiment. The experiment is seen as cutting off a small world from the great cosmic connection. So no realistic results can be found because every phenomenon is found only in this connection. Truth only is given in direct, unadulterated observation.

The consequence of this concept of nature is again that general rules must be won concerning phenomena in another way than in modern science. Between the need of generalisation of rules and the intention to uncover more and more subtle details there certainly exists a tension.

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[178] Dong Zhongshu, quotes after: Needham, Joseph, Science and Civilisation in China vol. 2 p.276, Cambridge 1977

Chengyi (1033 - 1108) puts the question if in the intention of reaching universal knowledge man must examine all phenomena or if it is enough to examine a single phenomenon. Both ways of course don't lead to any result

> "It is necessary to examine one thing after the other day by day. Then, after you have accumulated many experiences, the relations between things will suddenly reveal themselves."[179]

Thus even the universal appears as a sensually given shape of experience.

Finally we can ask whether the explained concepts of nature have any actuality in the modern world. A possible thesis which needs of course still a thorough discussion could be formulated in this way:

If we suppose that the modern world because of its breath taking tempo of the technical development and the adjustment of modern science to technology slides into a crisis, then you can demand that the problems of this crisis should not be solved only by taming this kind of science simply slowing down its tempo. Sciences themselves have to change the details of their methods. This crisis should be overcome by a methodical-scientific overcoming of a process which is known as reductionism.

Therefore it would be careless to refuse the discussion with other scientific traditions which already exist.

Werner Gabriel
Dr. phil., Professor, Department of Philosophy
University of Vienna
Board of the *KoPhil*
Association of Comparative Philosophy and
Interdisciplinary Education, Vienna
werner.gabriel@univie.ac.at

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THE EXPERIENCE OF SPACE

Western, Eastern and Recent Perspectives

Gerhard CROMBACH (Vienna/Austria)

I am not a philosopher. I am not a natural scientist (in the strictest sense). I am a psychiatrist (and in private interested in spiritual matters). Because of both involvements I am mostly concerned with experience. **Experience is primary.** It **is** our reality. As humans we can learn to extend it, learn to communicate and validate it. Yes, but as soon as we put experiences into **words**, misunderstanding is imminent, because *"expression never equals experience"*.[1] And finally: by putting our experiences into **concepts** we are losing contact with reality as such. Philosophical quarreling pops up! The Austrian philosopher Robert Reininger was quite aware of the limitations of reasoning: *"Reality can only be **experienced**; transformed into statements it will cease to be reality" ("Wirklichkeit läßt sich nur **erleben**, aber nicht in Aussagen überführen, ohne aufzuhören Wirklichkeit zu sein.").*[2] Therefore in the following presentation **the experimental approach** is most important – not my conceptualizations. As Wittgenstein precisely states: ***"Don't think, but look!"***.[3]

For a start or a first impression take a look at three paintings – being emblematic of different experiences of space. First the western view: Around 1510 Raphael painted "The School of Athens"[4]. In this picture you occupy a fixed point of observation (in central perspective), and you observe sharp details all over the image plane. Your visual perception corresponds – seemingly – to a good camera! – Now the eastern view: At about the same time (1495) Sesshu Toyo, a Japanese Zen-painter, created – in splashed-ink technique – a landscape: very sketchy and with a dominance of emptiness.[5]And finally look at a complete abstract painting – done by Agnes Martin in 2004. I paint – she said – *"with my back to the world"* – thereby communicating "*happiness without cause"* and "*infinite space"*.[6, 7]

1. WESTERN PERSPECTIVE

a) Mainstream

Martin Heidegger [8]gives us a good summary: *"In Western thought up to the present, space has only been seen in relation to bodies and objects, but never in relation to*

space as space for itself and as such." Thales of Miletus was – according to Aristotle – the first philosopher; but he also was an astronomer and mathematician, a clever businessman and political adviser – according to Herodotus. (Philosophers seem to be not that unworldly as it is usually claimed and suggested by the anecdote of Thales falling into a well!). Following Plato there is a coevolution of astronomy and philosophy: *"from this source we have derived philosophy"*[9]. The experience and conceptualization of space remains object-bound throughout Western history: Aristotle speaks of *"place"*, Descartes of *"extension"*,[10] and even when it becomes emotional, space is filled with stars: Kant feels *"admiration and awe"* in view of *"the starry heavens above"*. (Note: **"starry"** – and not in view of an empty blue sky – as in most Asian traditions!) When Heidegger writes *"up to the present""* one can think of Nicolai Hartmann's "Philosophy of Nature" (1950), wherein he claims that consciousness is ***"non spatial, without extension and place"***. [11]

What might be the reasons for such experiential and conceptual space limitations? There seem to be **intentional and perceptual causes:** both are very much related. Western philosophers live and think – worldly as they are – in the ***"action mode"*** – not in the *"receptive mode"*. [12]This means emphasis on purpose, effort, control, intellectual understanding and competition. In this sense the life of Aristotle has been interpreted rightly as *"**vita activa** of philosophical investigations"*. *"Philosophers are athletes of categories"*[13]. This attitude demands effort – this is pure striving! And when we are striving, we almost exclusively use the central field of vision! – Independently from this point of view (*"action mode")* Hermann Schmitz came – as result of his own space investigations – to an important conclusion: in history the philosophical idea of space was ***"too much governed by the central field of vision"*** *("zu sehr vom zentralen Gesichtsfeld geleitet").* [14]

What is the central field of vision? It measures about 18 degrees of the complete visual field (of about 180 degrees). Only within this small angle we see sharply and colorfully. You can roughly demonstrate the central field to yourself by putting your fists together – side by side at arm's length. Corresponding to the retinal structure it is also called macular vision. The sharpest sight you have only within about two degrees (foveal vision). It equates the area of your visual field covered by your thumb at arm's length. (Surgeons and dentists need this foveal vision – as you do, when cutting your nails.) The biggest area of the retina is only sensitive to light and motion. Out of the 'corner of your eye' you can't see sharply! **Mostly we are unaware of this peripheral vision**; nevertheless we need it very much: for example to avoid collisions with walls, oncoming pedestrians or quickly approaching cars. It largely functions

automatically. Being busy we don't pay attention to peripheral vision! Our awareness (and the awareness of philosophers as well) is restricted to a narrow "tunnel-vision"! (And **in a tunnel** the three-dimensional **geometric space** is quite adequate ...)

But you can get rid of this perceptual restriction, as it had happened – some 80 years ago – to a young British psychologist. Marion Milner – many years later a famous psychotherapist – had written an interesting diary. [15]She observed by experience that there exist ***"two quite different ways of perceiving": "wide and narrow attention".*** She gives us an example: *"To explore the sky for aircraft a searchlight must travel backwards and forwards ... My thought can do that, but it has another movement as well; it can widen its beam and survey the whole sky at the same moment ..."* She describes ***"narrow attention"*** as *"automatic"*, as serving *"personal desires"*, as *"essential for practical life"*, and *"blind to the wider surroundings"*. (This corresponds very well to the *"action mode"* that I was talking about just before.) And what are the characteristics of ***"wide attention"?*** Most important is the attitude: *"I want nothing!"* This was her personal phrase to trigger wide perception. If you want nothing, then there is *"no need to select"*, and it is *"possible to look at the whole at once"*. In this way one can widen attention *"voluntarily"* – but only very gentle; not by force. Also *"views and sweeping vistas"*[ii] can widen our perceptual field. Don't we – quite naturally – enjoy big vistas?[iii] Marion Milner was overwhelmed by the *"quality of delight"* wide attention can bring about. – What may had happened in the history of thought, if philosophers had ***"deliberately restrained that continual effort after purposes"?*** [16] [17]

b) Subsidiary track

In the Western religious, spiritual, literary and poetic tradition there have always been individuals who discussed, experienced and expressed – contrary to the mainstream – **the spaciousness of mind**. Here we have Henry More – opposing Descartes; we have Angelus Silesius, Novalis, Jean Paul, Emily Dickinson, Leo Tolstoi, Fernando Pessoa, Robert Musil, Brigitte Kronauer – among others. I will present just two examples: the British poet (and Anglican priest) Traherne, and the Austrian poet Rilke. It seems important to notice that Rilke's expressions in the two selected poems (as is his neologism: *"world-inner-space" = "Weltinnenraum"*) are not products of fantasy or metaphysics. They are based on **real experiences** – on a bridge in Toledo, and in a garden in Capri. [18]

Thomas Traherne (1637-1674):

"His very Cranium is it self a Skie" [19]*--- "My Essence was Capacitie" ---*

"The utmost Star, Tho seen from far, Was present in the Apple of my Eye." ---

"A Deep Abyss That sees and is" [20]

Rainer Maria Rilke (1875-1926):

"Ah, not to be cut off,
not through the slightest partition
shut out from the law of the stars.
The inner – what is it?
if not intensified sky,
hurled through with birds and deep
with the winds of homecoming." [21]

*

***"One** space spreads through all beings:*
world-inner-space. The birds fly quietly
through us. O, I who wish to grow,
*look outward, and **within** me grows the tree."* [22]

2. EASTERN PERSPECTIVE

In most Asian spiritual cultures mind has – surprisingly to us – spacious quality: so in Daoism, Hinduism (Advaita Vedanta), Kashmir Shivaism, Chan/Zen-Buddhism. **In Dzogchen (Tibet) spaciousness is the most prominent feature of mind.** What might be the reasons? **1)** An existential and experiential approach to human life: "What am I? What ***is*** my suffering self?" (This contrasts sharply with most Western thinking: *"The problems mainly investigated by Aristotle ... are not the experiences of truth **per se**, but analytical thinking which has to clarify the causes of phenomena ..."* [23]**2)** The development of refined meditative practices – starting with calming down the restless mind (= *"receptive mode"*, 12). **3)** In Tibet (Dzogchen) the outstanding blue sky – over the barren landscape – may be easily experienced as the mirror of mind (= peripheral vision without effort and fixation!)

Two examples out of the **Advaita Vedanta – Tradition**; ancient and recent:

Shankara (788-820):

"Contemplate the one self that is like unlimited space." [24]

Sri Nisargadatta Maharaj (1897-1981):

"When you become one with consciousness you become one with space." [25]

Two examples out of the **Zen – Tradition**; ancient and recent:

Zen Master Hongzhi (1091-1157):

"When the stains from old habits are exhausted, the original light appears, blazing through your skull, not admitting any other matters. Vast and spacious, like sky and water merging during autumn, like snow and moon having the same color, this field is without boundary, beyond direction, magnificently one entity without edge or seam." [26]

Zen Master John Hurrell Crook (1930-2011):

"Where am I? – Where his head should have been there was a kind of vacant space through which the wind blew and in which the buzzards called, an open feeling, an absence of boundaries, no horizon."[27]

The homeland of **Dzogchen** is Tibet. Dzogchen ("the Great Perfection" or "Great Completeness") has two roots: a native-tibetan root ("Bön") and a buddhistic-indian root. As a consequence of the Chinese occupation of Tibet this old teaching meanwhile has spread worldwide. Here are some quotations:

Tilopa (988-1069):

"The mind's original nature is like space." [28]

Longchenpa (1308-1364):

"Pure mind is like space. – The mind is like sky." [29]

Düdjom Lingpa (1835-1904):

"The essential nature of my mind is definitely space." [30]

Tulku Urgyen Rinpoche (1920-1996):

"In the ultimate sense, space and awareness are a unity." [31]

Chögyam Trungpa (1939-1987):

*"Fundamentally there is just open space, the **basic ground**, what we really are."* [32]

Tenzin Wangyal Rinpoche (*1961):

"Space is what we truly are." [33]

As already mentioned: for Tibetans the daylight-sky is mind's most intimate metaphor. Why is this so? Awareness and sky share some important qualities! These are common similarities: *"open, clear, boundless, empty, spacious, unchanging, ungraspable and immovable"*. [34]– In his voluminous autobiography the Tibetan yogin Shabkar (1781-1851) gives us an outstanding and moving example: [35]

"One day, to refresh my spirits, I walked to a summit of the Machen Range and, relaxing my mind completely, I looked around in all directions. My mind opened up, becoming clearer and clearer. I sat, keeping my back straight, and looked straight ahead into the infinite expanse of the sky. My mind blended with the sky, becoming indistinguishable from it. … I sang this song, in a state like space, an unlimited, transparent, all-pervading expanse. …

This utter, complete openness:

Space, inseparable from awareness.

As far as sky pervades, so does awareness.

As far as awareness extends, so does absolute space.

Then, I rested one-pointedly in the evenness of a sky-like emptiness. All mental wildness and dullness, gross and subtle, vanished naturally, like clouds vanishing in the sky. Like the sun shining in a clear autumn sky, the luminous emptiness that is the true nature of mind was laid bare. In a state without center, without limits, empty like space, all phenomena – forms and sounds – were present in spontaneity, vivid as the sun, moon, planets and stars. Mind and phenomena blended completely in a single taste."

3. RECENT PERSPECTIVES

a) Philosophical Investigations

When you open your **mouth**: is there a kind of spacious feeling? – When the German philosopher Ute Guzzoni[iv] writes that **silence** has *"a spacious character"*: can you – in a state of relaxation – experience this too? The experiences of silence and space are

intimately connected: *"the motionlessness of silence refers to a space, – the space of emptiness"*[36]. – And what about **music** – heard deeply? The emigrated Viennese music-philosopher Victor Zuckerkandl emphasizes *"that the space of our practical life and our scientific thinking is not **all** of space … music makes us understand that we do not learn all that is to be said about space from eye and hand, from geometry, geography, astronomy, physics. The full concept of space must include the experience of the ear, the testimony of music"*.[37] For this "sound-space" see also my "John-Cage-article". [38]

I had already referred to the founder of the "New Phenomenology", Hermann Schmitz, when considering the restricted space of central vision in Western philosophy. Putting together the experiences of sight, hearing, bodily experiences, smell and atmospheres (like sultriness) Schmitz came to a most basic and comprehensive definition of space. [39]***"Vastness ('Weite') is the common feature of all spatial conditions." – "Vastness is the necessary and sufficient condition of spaciousness." – "What is vastness?" – "ein Urphänomen"*** (= an original, unreducible, indefinable phenomenon **–** like it's opposite: ***"narrowness" ('Enge')***.

But Schmitz – lacking an appropriate method of exploring awareness as such (like Western philosophers generally) – was unable to connect *"vastness"* to the Eastern experience of spaciousness of mind. He got very much stuck in his most favourite concept: the concept of *"atmosphere"!* Nevertheless his definition of space is – in my opinion – phenomenologically correct and a big advance!

b) "Insight meditation" without religious cosmology, belief and ritual

Globalization enables us to get easily in touch with old Asian mental practices and their related attitudes to life as well. But today many practitioners and spiritual teachers are no longer bound to any **specific** tradition, because we are – mostly – sensitive to widespread fundamentalism and cultural artefacts. All traditions have their advantages and their shortcomings! The most common "technique" is "insight or open awareness meditation": we are learning to be silent, effortless, letting go of control, and to identify with awareness – instead of body, thoughts and feelings. [40, 41] It's the most radical practice of the ***"receptive mode"***[12]: *"Presence is the bare awareness of the **receptive spaciousness** of our mind."*[(my italics)] *– "This mode of knowing and being … has a spacelike or spacious aspect."*[16] *– "Experience of panoramic awareness and of space are natural outgrowths of mindfulness/awareness meditation."* [42]When this meditative state stabilizes more and more, and when it

spreads out in daily life – over years **a transformation of consciousness, a shift of identity** may happen. Some examples:

"And ultimately it becomes clear that we are not a subject experiencing this spaciousness; we are the spaciousness."

A.H. Almaas[43]

"The sky exists in this vast opening that I am; the sky is in me."

K. Wilber[44]

"What or who I am is now spacious emptiness."

R.K.C. Forman[45]

"I am aware space – that same aware space that gives rise to everything that is."

Adyashanti[46]

c) "Headlessness"

It's not that delightful for everyone to sit hours and hours in silence! So there is – fortunately – a different approach too. It started with a drawing done by **Ernst Mach** in 1886 – entitled *'Self-regarding Ego.*[47] It's a self-portrait without a mirror – rather amateurish because it's quite impossible to draw our visual field! **Ludwig Wittgenstein** had got bogged down in this certainly correct, but quite formal aspect of Mach's drawing. I think Wittgenstein did not follow his own marvelous insights here. His first overlooking: *"The aspects of things that are most important for us are hidden because of their simplicity and familiarity"*.[3] The meaning of this portrait **can be** very simple! And the second failure in noticing: Mach's drawing resembles – in some way – the 'Duck-Rabbit-drawing' which had fascinated Wittgenstein very much. At least it **points to** a possible switch-phenomenon. [48] But here – in Mach's drawing – Wittgenstein could not "*distinguish between the 'continuous seeing' of an aspect and the 'dawning' ('Aufleuchten') of an aspect"*.[3] This astonishing "*dawning*" had happened first to **Ernst Bloch**, the Marxist philosopher, in 1934: "*This is truly how a person sees himself all day: without a head*". He was moved by Mach's picture: "*its surface is an abyss*[49] Even more moved – measured by consequences – was the British architect **Douglas E. Harding** when he had seen this extraordinary self-portrait in 1943. After questioning himself over some years "Who am I?", it meant a profound answer, a deep revelation to him: "the penny dropped".[v] He published "On

having no head" in 1961, [50] and developed a series of experiments to bring the recognition of spaciousness into foreground: [51]

"Point to what you're looking out of." – "You are looking out of infinite Space."

"You are Space for the world."

"Another name for this Capacity is Silence. Are you not now the Silence into which these sounds are dropping?"

"Thoughts and feelings are born, flourish, and die in the awareness, the awakeness, of this great Space."

Just reading these sentences is completely useless! Just reading Harding's books does not make sense! Please remember Reininger[2] and Wittgenstein: ***"Don't think, but look!"***[352]. **You have to perform** some of Harding's experiments! In this way you may come from someone else's opinions (and your naturally corresponding doubt) to personal **experience**: *http://www.headless.org* ("The headless way")! – "In-pointing" and using a "paper-tube" in front of a mirror[53, 54]are especially helpful. – You will notice that these experiments are applying *"wide attention"*[15] – a wide angle view – to your own being! The astrophysicist Piet Hut considered them as *"a form of phenomenological **epoché**, refreshingly unsophisticated and down-to-earth"*. [55]

How does it apply to followers? Two examples:

When **Judy Bruce**, a student of Zen, visited Harding, he asked her spontaneously: *"What are you looking out of?"* She replied: *"My eyes."* Harding responded harshly: *"What nonsense!"* And Judy – being shocked: *"I am looking out of nothing!"* – Her contemplation of *"mu"* had been resolved. [56]

In a personal communication with **Tess Hughes** (Ireland) in 2012 – as my response to her YouTube: [57]

G.C.: *"Do you feel that 'I am' (as you say) has continuously an unbroken spacious quality?"*

T.H.: *"You probably know that I practiced Harding style 'seeing' for three years. I took to it because Douglas described it as 'meditation for the marketplace'…Yes, I used the word spaciousness to describe how it is after the change. Since it is so difficult to describe it this was all I could think of at the time and it is still fairly*

accurate, only that I have become accustomated to it. It does not come and go. It is steady and always present. It is a transformation of being and it is always present. …"

A last comment on Western philosophy: the French phenomenologist **Maurice Merleau-Ponty**[58] was quite aware of our *"abyss"* (Bloch) – he called it *"quasi-space"* and *"void"*. This reserved and restricted ***"quasi"*** reflects very much the Western understanding of space – being exclusively external to us. No penny dropped in Merleau-Ponty!

4. DIAGNOSIS AND THERAPY

"For man has closed himself up, till he sees all things thro' narrow chinks of his cavern."

William Blake[59]

"What can we do? I recommend taking the medicine I call spaciousness."

Tenzin Wangyal Rinpoche[60]

Whatever method you may choose, Dzogchen's brilliant "hood"-metaphor aptly describes the experience: *"That moment is like taking a hood off your head. What boundless spaciousness and relief! This is the supreme seeing: seeing what was not seen before."* [61]This healing, this shift of identity – our recognized boundlessness – does not mean we have overcome suffering. It only means that **we don't identify** with our suffering existence. In spiritual terms we are *"a unique incarnation of Reality".*[52] At least **we are embodied vastness**: therefore we **also** have extension and place – we have our environment, our genes and psychology! You may experience this as "Emptiness Dancing". [62]

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Gerhard Crombach
Dr. med., Researcher for Transpersonal Psychology,
Vienna, Austria
gerhard@crombach.me

Goetheanism – Another Way to Look at Nature

Gerhard KLÜNGER (Vienna/ Austria)

Introduction

The main purpose of this paper is to contribute to the fundamental question of philosophy of science: What is the relationship between thoughts and sensual perceptions?

Johann Wolfgang Goethe (1749 – 1832) is well known as a famous German writer of lyrics and poetry and as the author of "Faust". Less known is the fact that he was also a statesman. Rather few associate with Goethe the term "scientist". Goethe's theory of colors will be sometimes mentioned, but adding immediately, that this theory "lost" in competition with Newton's theory of light.

A closer look at history shows that Goethe's work had tremendous influence not only on his contemporaries but also later. Many composers took poems from Goethe as a textual basis, painters got a deeper understanding of colors, Hegel, Schopenhauer, Kierkegaard, Nietzsche, Cassirer, Carl Jung and Ludwig Wittgenstein were spurred by his ideas. Nikola Tesla learned "Faust" by heart and in reciting repeatedly a certain verse got the idea of the rotating magnetic field and the invention of alternating current.

Goethe published not only literature but wrote also an early work on linguistics, the theory of colors, and mineralogy. A special kind of iron oxide was named "goethite". With 17.800 rock samples, Goethe had the largest private collection of minerals in Europe. In Faust II he mocked about the contemporary theory of volcanic activities to explain the occurrence of glacial erratics in northern Germany. His studies in morphology and osteology together with the concept of evolution convinced him that there has to be an intermaxillary bone not only in mammals but also in humans, what he could finally prove independently of other researchers. He established the view that the skull is a metamorphosis of a spinal vertebra.

In his "Metamorphosis of Plants," he showed that all parts of a plant can be understood as metamorphic forms of the leaf. He developed the "Goethe-Barometer" based on principles established by Torricelli. His "Theory of Colors" was widely adopted by the art world and based on it Schopenhauer developed his own theory in "On Vision and Colors" and inspired Ludwig Wittgenstein to write his "Remarks on

Color". Goethe was the first who systematically explored the physiological effects of colors and anticipated Ewald Hering's opponent color theory.

In his essay "The experiment as mediator between subject and object" Goethe gave a methodology on how to deal with phenomena and how to use experiments. Novalis, himself also a geologist, regarded Goethe as the first physicist of his time and as "epoch-making in the history of physics".

Up to here, this information can be found in Wikipedia as in encyclopedias. The following talk is based on books of Rudolf Steiner. When Goethe's complete work should be published in the "Weimarer Edition" ("Sophien Edition"), Rudolf Steiner, who studied mathematics and sciences at the technical university in Vienna, twenty-two years old at this time, and recommended by his professor Karl Julius Schröer, was 1883 asked by the Publisher, Joseph Kürschner, to edit and comment Goethe's scientific writings. The recommendation of Steiner by Schröer for this job was probably based on the observation, that Steiner's thinking was close to Goethe's methodology. Just fifty years after Goethe's death, Kürschner felt the necessity to provide some introductions and additional comments to make Goethe's view for the broad audience, often expressed in an artistic way, comprehensive. Steiner took strong efforts to demonstrate that it was Goethe's method that was the key to his success. According to Steiner, Goethe's methodology was not the result of philosophical considerations but was the result of a specific worldview. This worldview was already given in Goethe's character and not adopted from others. Goethe studied different philosophers but stayed unsatisfied with their views, until he read works of Spinoza, where he found in clear words expressed what he had felt already since a long time.

Steiner's introductions covered the theory of metamorphosis, the formation of animals, organic formations, Goethe's view of mathematics, geology, and meteorology, but also Goethe's way of thinking and his relation to other views. Steiner published the results of his studies of Goethe's work in a series of books. "Goethean Science" (= GA 1, 1983), was followed by "The Science of Knowing (The Theory of Knowledge Implicit in Goethe's World Conception" (= GA 2, 1885), "Truth and Knowledge" (= GA 3, 1882)), and "Goethe's Conception of the World" (= GA 6, 1897). In "The Philosophy of Freedom" (= GA 4, 1894) Steiner applied his methodology to questions of Philosophy of Science. Though published more than ten years after "Goethean Science", it would not be correct to say that Steiner learned from Goethe the methodology. As already mentioned, Steiner's way to look at "world" enabled him to

understand and lay open Goethe's method. Later this was called "goetheanism" or "goetheanistic method".

To remember: Novalis considered Goethe as the greatest scientist of his time and examples of his manifold discoveries were already mentioned. Is it possible to learn from a genius "how to do it"? The talk will discuss some important features of Goethe's methodology and views as described by Rudolf Steiner. According to Steiner, Goethe's interest never aimed at the discovery of new facts but to acquire new points of view to look at nature[180]. So, for example, he did not invent new colors but found the complementarity of colors. He tried to find the rules and laws how phenomena are interconnected and – in contrast to contemporary and modern science – never tried to explain the phenomena themselves as the result of some constructed, hypothetic entities beyond observability. Goethe rejected Newton's theory of some kind of invisible "particles" which should be the real reason for the mere mental impression of "light". In accordance to Aristotle, Goethe tried to find the essence of the objects, the underlying ideas, *in* the objects and rejected rationalistic methods to immediately create a theory or hypothesis in connection with phenomena. It is called "anschauende Urteilskraft" ("contemplative judgment") how to find the essence. However, he rejects explicitly metaphysics and refers to natural sciences. The task of experiments should not be to test hypotheses but to make in a "cleaned" environment the pure relations between phenomena "visible". Only such hypotheses are allowed that can end to be hypotheses – what reminds us of Popper's falsification criterion.

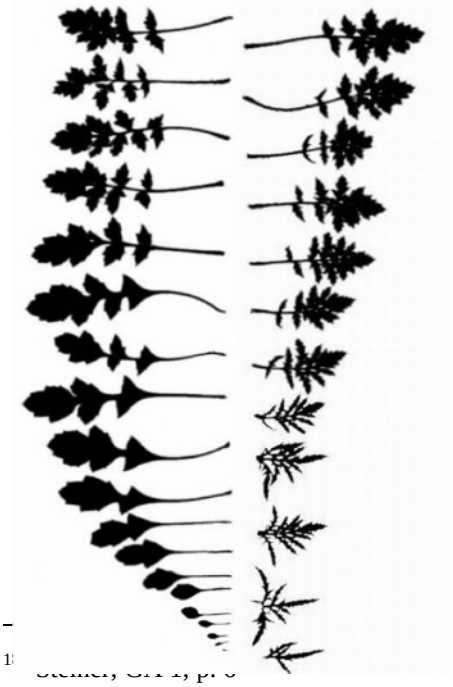

Figure 1Sequence of leaves of *Papaver rhoeas L. arranged in a loop, starting bottom left with the first tiny leave coming*

Goethe and the "primordial plant"

To get an exemplary presentation how Goethe approached a problem, let us have a look at his botanical studies. At a time a question arose in Goethe: how is it possible, that I can recognize all plants as plants? There are so manifold genera and species, no single plant of a species looks like the other of the same species, no single leaf is identical in form and shape to another one even on the same plant (see Fig. 1). This

question he noted on his "Italian Journey" 1787. At this time, he believed that there must be a kind of an archetypal plant that is common to all other plants and that has to be realized somewhere. When he spoke to Schiller about this problem, he drew with few lines a sketch of a symbolic plant, representing the fundamental idea of "plant". This symbolic plant should express something that comes to appearance in every plant; however this plant looks like – as long as it is a plant. It should demonstrate the growth of the different parts of a plant, how the different organs of a plant develop from other organs and to show the relationship to other plants.

As Schiller saw this drawing of this primordial plant that, according to Goethe, should be living not in a single, but in all plants and therefore be the fundament why all plants are plants, Schiller replied to Goethe: "this is no experience, this is an idea." Goethe got conscious about the fact that he got his symbolic figure of the plant just in the same way he built concepts about other things of the world that can be seen with eyes and touched with hands. Goethe considered this symbolic plant or "primordial plant" just as objective as a single plant. He was convinced that his primordial plant was not a speculation, but the result of unbiased observation. So he answered to Schiller: "*I am very satisfied if I have ideas without knowing it, and can even see them with eyes*." Schiller replied: "*How should it be possible that an experience (perception) is equivalent an idea? Is it not just the characteristic of an idea that never a single experience can express all that could be covered by an idea?*"[181]

We see here two opposing world views. Schiller distinguishes two sources for recognition: the "outer" observation and the "inner" thinking. For Schiller are these complete different and separated realms. What he calls "experience" is valid only for sensual experiences in time and space. For Goethe ideas are immediately present *in* the objects, the idea *in* the object is responsible for how the object is, how it appears to the senses but also to the unbiased thinking. For Goethe it doesn't make sense to say, an object is not corresponding to an idea, as Schiller argued, because it is the idea that *is* the object. If different plants look different then the reason for this is that the idea of the plant expresses itself in different ways – but, according to Goethe -, it is always the same idea.

[181] Steiner, GA 6, pp.21-22.

Goethe's Theory of Colors

To mention two physicists who have dealt with the topic:

"And I for one do not know how anyone, regardless of what his views about colors are, can deny that the theory in itself is fully consequent, that its assumptions, once granted, explain the facts treated completely and indeed simply". (Helmholtz 1892)

and Werner Heisenberg judged in 1952, p. 60:

"Goethe's color theory has in many ways borne fruit in art, physiology, and aesthetics. But victory, and hence influence on the research of the following century, has been Newton's."

What is the specificity of Goethe's Theory of Colors? First of all, the original is named "Farbenlehre". If "Lehre" is translated with "theory", then – at least for the English readers – it might be easy to judge it not as "theory" at all. It is rather a great compilation of systematic observations, facts in connection with light and colors, a doctrine. According to Goethe are all facts already a theory[182], meaning, in human spirit an ideal element shows up as soon as human observe "facts".

"Along with the rest of the world I was convinced that all the colors are contained in the light; no one had ever told me anything different, and I had never found the least cause to doubt it, because I had no further interest in the subject. But how I was astonished, as I looked at a white wall through the prism, that it stayed white! That only where it came upon some darkened area, it showed some color, then at last, around the window sill all the colors shone … It didn't take long before I knew here was something significant about color to be brought forth, and I spoke as through an instinct out loud, that the Newtonian teachings were false." (Goethe, pp 295-296).

Goethe's way to look at nature or phenomena lead him to the conviction that he had to consider "black" not just as an absence of light, as Newtonian physics taught, but as a real quality. For most of us it is a hard exercise to dive into Goethe's way of thinking. Being socialized and educated in "western style", we grew up – same as Goethe did – with the Newtonian concept: White light is a mixture of all colors, and "black" is just the absence of light. From where then comes the impression of "black"? A ready at

[182] «Alles Faktische ist schon Theorie», (Goethe, Naturwissenschaftliche Schriften, 4. Bd., 2. Abt., S. 503, quoted in Steiner, GA 1, p. 339).

hand answer would be, that our physiological organization “translates” the absence of light into “black”. Goethe is far away to construct such “theories” about the organism and how it might work. He experiences “black” as an own quality, and this experience doesn’t change by physical or physiological explanations. One might say: if “no light” would be synonymous with “there is nothing”, then according to Goethe, if there really would be “nothing”, we would not perceive anything. But we perceive black. So the black must be there, filling the space. The more light is reduced, the more black or “darkness” gets visible. Everybody can experience this. The difference is how Newton and Goethe interpreted this empirical data.

Goethe experienced, in the same way, other colors. Newton’s experiments with “white light” are based on the observation with slits and prisms. Goethe found the first appearances of colors also using a prism, but without slit; one dark line was enough (see quote above). For Goethe his experiments with a dark spot on white paper or a white spot on dark (black) paper, observed through a prism, convinced him that the phenomena on these conditions were more basic than the effects gained with the help of a slit. As the most fundamental phenomenon, he found that light behind a turbid medium appears yellow and becomes red as the turbidity increases, and darkness behind turbidity appears blue. So, for example, the red of a sunset or the blue of the sky can easily be understood as examples of what he called “Urphänomen”. Such a “primordial phenomenon” expresses a physical law – a relation between phenomena – that cannot be reduced to simpler relations. With other words: the simplest way to produce a perception of color is to set turbidity in relation to light or darkness.

In Steiner’s interpretation has every law of nature the form: if this fact comes together with another fact, then there will be a specific outcome. “If an object is placed between a light source and another object, then the first object casts a shadow onto the other.” “If there are two bodies with different temperature then heat flows from the warmer to the colder until both have the same temperature”. These are examples of “primordial phenomena”, they cannot be reduced to or explained by simpler relations. Every progress in sciences is based on becoming aware of such primordial phenomena.[183]

It doesn’t make sense for Goethe to say: these colors are based on particles, as Newton did with his corpuscular theory of light. The impression of a color doesn’t change to anything else if we reduce this quality to a corpuscle we cannot observe at

[183] Steiner, GA 2, S. 92.

all. Goethe deals with qualities and avoids questioning “what is behind?” He cannot see any advantage to reduce a perception to something that cannot be perceived. Physics is usually on the way to the “behind”, to the fundamental, the underlying, the underlying principle. Newton showed with his slit experiments that colors can be produced in this way – but in fact, he could not explain from where the colors come. For him, the colors were a mere intrapsychic phenomenon. His way to prove this was to overlay two spectra in a way that magenta (“purple”) could be seen. This color can be seen – but does not appear in the normal spectrum of white light. So his conclusion was, first that magenta is no “color of light”, but in addition, that all colors are not “in the objective world”: “he clearly states that color is a sensation within the mind and not an inherent property of material objects or of light itself”[184] It is somehow fascinating to see two scientists, observing a color. Both of them see the color. One says: there is no color in reality, it is only a phenomenon within the mind, and the other says: I see the color, why should I doubt that there is a color?

Goethe’s methodology never transgresses the borders of observability. The advantage of this habit: he never runs into speculation as he sticks to perceptibility. Newton, in contrast, soon developed a theory about the “true nature” of light. He thought that the light is composed of particles185, in this way reducing the quality of light and of colors to something imperceptible – and especially, without qualities. No wonder that having done so it is impossible to understand, how those invisible particles can produce colors in consciousness. Furthermore, as it is known by history of physics, about hundred years later Christiaan Huygens, a Dutch mathematician and scientist, declared 1650 light as a phenomenon of waves within a hypothetic “ether”. The first reason was that Newton’s theory failed to explain diffraction, interference, and polarization of light – with the wave-theory this was possible. The second reason was: if there are “waves” there must be a medium capable of forming waves. No medium was known that could vibrate at such a high speed (about 500.000.000.000.000 times a second) but on the other hand, should be immeasurably light (weight) and without resistance to other objects and so on, so the “ether” had to be set “hypothetically” by needs of the theoretical model. In any way, Huygens introduced mathematical models into optics, overcoming pure observation. When 1905 Albert Einstein gave an explication of the photoelectric effect, the corpuscular theory of light was

[184] See “Opticks” in Wikipedia, https://en.wikipedia.org/wiki/Opticks (retrieved 2016-05-07)

[185] „That is, Newton does not ask whether light "is" or "may be" a "body." Rather, he declares: "Is not Light a Body?"”, ibid.

reestablished, but was then in contradiction with the phenomenon of constancy of light velocity: if light would consist of particles, these particles should have a higher speed in the case that the light-emitting object moves in the direction of the light emittance (addition of velocities). But this could not be observed and was one reason for the invention of the theory of relativity. Quantum physicists retract to the formulation, that what the nature of light "is" cannot be said, but depending on the design of an experiment the results can be better explained by wave- or by corpuscular theory respectively. Modern physics gave up any clearness (in the sense of "representation").

We can see already the problem: the way of physicists with their theoretical models and assumptions is, especially as soon as mathematical models are included, somehow "agreeable" and acceptable for scientists as they are able to calculate effects and make predictions. On the other hand they lose the possibility to explain "quality". In addition, they find themselves more than once in the embarrassing situation that they have to abandon a theory, a model that was held for a true insight in nature, leaving the question behind, if sciences at all are able to recognize how the world "really" is.

According to Helmholtz, a German physicist and physician who made significant contributions to many areas of modern science, Goethe's theory of color is in its main parts still valid though physicists do not work with this theory (see quote at the beginning of this chapter). The reason for the ongoing validity is that Goethe exactly observed phenomena in their relations and avoided to explain the phenomena by some "underlying" considerations of "matter" or give "reasons" for the phenomena. He doesn't put such questions like "why is the blue blue", aiming at some underlying, invisible basics and assumptions, but focused on the question: under which conditions appears "blue". This difference should be carefully taken into consideration to understand the fundamental difference between modern physics and the goetheanistic approach. On the first glance, one could say: well, I cannot see a difference, both try to understand under which conditions human have a blue impression. But with a closer look we see that physics explain the blue based on something invisible, underlying, be it particles or waves or quants. Physics excludes the human to gain something that could be considered "objective". Soon it is of no importance if there is a human recognizing or experiencing "blue". If an apparatus "detects" something that was formerly defined as "blue", physicists call it "blue", even if there is no perception of "blue" at all since there is no perceiving human but only the sensor of a measuring instrument. For Goethe, it doesn't make sense to exclude the human to gain a position

of “objectivity”. Only for a human it makes sense to call a perception “blue”. The famous question: which sound makes a falling tree in the wood if nobody is there makes no sense since “sound” is tied to perception. Physics tries to separate the perception of sound from the underlying – sound waves in the air –and takes the latter for the only real. So, according to physics, the falling tree in the wood would “objectively” make a “sound” even if no human is there. Goethe would not deny that there is something going on, but as long as there is no real perception of a sound, there is no “sound”. “Sound”, “color” are phenomena, and as the word “phenomenon” denotes: it means that a subject perceives something. A phenomenon beyond perception is no “phenomenon” at all.

On the level of phenomena Goethe would probably not mind if it could be shown that “blue” is connected with distinct vibrations of an etheric body – as long as these vibrations and this etheric body would be visible or somehow perceivable, but he would not reduce the phenomenon “color” to such vibrations. He thinks that a movement can only produce another movement, but not produce a new quality. As a consequence, he denies that white light is composed of colors. Newton’s experiment demonstrating the splitting of a white beam of light by the use of a slit and a prism is not convincing for Goethe. He thinks that the colors are not components of the white light but that “colors are deeds and sufferings of light”[186]. Let us be not distracted by this poetic expression: for Goethe the colors do not come out from the white light by splitting but *emerge* in their visible form through or mediated by the apparatus. When for physics “light” can be considered as electromagnetic frequency and a phenomenon of “matter”, for Goethe “light” is not the sunlight, but an idea. And similarly with his idea of the “primordial plant” he treats his idea of light: As the idea of a plant, as their essence, as their inner principle, undergoes a manifold of different realizations in visible, real plants, so the idea of light: depending on the circumstances the idea “light” can emerge in many different colors visible not only for the mind but also for the eyes. In this sense, a candle doesn’t produce “light” but only bring some kind of manifestation of “light” to a visible existence. No object can “produce” a color (a quality), the objects can only bring qualities into appearance.

For modern physics, this is a completely weird concept and metaphysically loaded, as it presupposes “ideas” as real existing in the outside world, qualities as preexisting entities independent of substantial objects. Modern physics does not notice that its

[186] „DieFarben sind Taten des Lichtes, Taten und Leiden.“ Steiner, GA 6, p. 180

concept of “matter” as the fundament of all existence is also a metaphysical assumption because “matter” as such can never be observed by any means and finally turns out to be an idea as well. In contrast, Goethe is convinced that human can *perceive* the idea with his mind in “contemplative judgement”[187] as he is able to perceive the manifestation of the idea with his senses. Sciences, in contrast, neither trust in perceptions nor in thoughts. Though all conclusions drawn by sciences are necessarily the product of thinking, the general belief is that thoughts are only subjective representations and have nothing to do with the “world in itself”, to use a Kantian terminology. And in respect to perceptions science is also convinced in their subjectivity as a mere intrapsychic occurrence, depending on the individual functionality of sensual organs, nervous system, and brain. If a color blind person cannot perceive colors then for physiology this is taken as proof that colorful perceptions are only subjective products. How “world” really looks we can never know because we are dependent on our sensual organs. For Goethe, it would be a meaningless question how world “really” looks like: *looking like* is always something in relation to a distinct observer and his sensual organization. If we would have different or additional sensual organs we would have perceptions according to this organs, would perceive new and different qualities – but our task to find the relations between the perceptions would not change at all. For Goethe science aims at the relations between and connecting the phenomena and not, if a red rose is “really” red or how the “red” looks for another individual or which invisible things produce the mere internal psychic impression of “red”.

Already at lifetime Goethe was accused of avoiding mathematics. Goethe himself admired mathematics and he aimed at a science that is in its methodology as strict as mathematics.[188] But Goethe had a clear opinion where it is useful to use mathematics and where not. As mathematics deals with numbers and numbers refer to size, Goethe found that no object displays as only property “size”. If mathematics is the only method applied in sciences, then all other properties and qualities except size get lost. What remains from the object would be an “*abstractum*”. But nature is not only quantum but also quale. Someone who is not good at mathematics has to restrict his or her science onto qualities (qualia), but this does not mean that without mathematics it

[187] Contemplative judgement: „Anschauende Urteilskraft“ «Goethes Naturwissenschaftliche Schriften», Bd. I, S. 116.

[188] Goethe, Natw. Schr., 2. Bd., S. 19, 45.

would not be science any more.[189] In contrast physics, according to the principle "measure what is measurable, and make measurable what is not so", tries to reduce all qualities to quantities, and having done so, wonders in addition, how quantities, in turn, can produce qualities. Emil du Bois-Reymond, a German physiologist, outlined this view already 1872 in the famous "ignoramus et ignorabimus"-lecture, meaning "we do not know and will not know":

> "… Nay, we may conceive of a degree of natural science wherein the whole process of the universe might be represented by one mathematical formula, by one infinite system of simultaneous differential equations, which should give the location, the direction of movement, and the velocity, of each atom in the universe at each instant. … Before our differential equations could be brought into the universal formula, all natural facts would have to be reduced to the motions of a substantially undifferentiated and consequently property-less substratum of what appears to us as heterogeneous matter: in other words, all quality would have to be explained by the arrangement and the motion of this substratum. … It is absolutely and forever inconceivable that a number of carbon, hydrogen, nitrogen, oxygen, etc., atoms should not be indifferent as to their own position and motion, past, present, or future. It is utterly inconceivable how consciousness should result from their joint action. … That it is and ever will remain utterly impossible to understand higher mental operations from the mechanics of the cerebral atoms (supposing them to be known), needs not to be proved. …"[190]

Contemplative judgement

What Goethe distinguishes from an empiricist is that he expands perception also into the realm of ideas. Goethe does not just collect observations, he puts them in relation, tries to group them in a way that the eye of his mind can catch the idea living in the objects given by sensual observation. He considered thinking as an organ to perceive ideas (the essence of objects) similarly as the sensual organs are a means to perceive objects. As the essence of an object is its idea, it depends on the particular (sensual) organ in which way the essence shows up. A rose might be perceived red, smells like a rose and the mind perceives the idea "rose". It is a major conviction that because the

[189] Steiner, GA 1, p. 240f.

[190] Du Bois-Reymond, 1872.

thought appears “inside” it is a mere subjective representation of the objects. Steiner pointed out that this is a prejudice: also the smell of a rose appears “inside”, but the location of appearance doesn’t say anything about the affiliation of the smell which is obviously to the rose. The same applies to concepts: they appear in the mind but they belong to the object in the same sense as the smell of a rose belongs to the rose.[191] We remember Goethe’s reply to Schiller when he admitted seeing his ideas with eyes. With the following example I will try to demonstrate this process:

“We try to find for ourselves a proof for the claim that the sum of all angles in a flat, Euclidian triangle is 180° (provided the full circle has 360°). To help our imagination we make a drawing, being aware that the lines are not really “straight” as there is an influence of the flatness of the paper and the quality of the ruler and the evenness of the moving of the pencil along the ruler, and because of the thickness of the pencil the lines are not infinite thin and so on. We bear in consciousness that our question is aimed at an ideal triangle and not to our sketch. We were told that if the rule with the 180° is true then it does not matter which triangle we draw. Furthermore, our thinking tells us that it is not allowed to measure all three angles and add up the sum since the measurement cannot be as exactly as necessary and is dependent also on the thickness of the lines and so on. We aim for an ideal solution that is independent of our distinct sketch, not for an approximation. As we think about an “ideal” solution it is already clear where the journey goes: The answer to our problem can only be an idea, nothing else.

After some time of consideration, we might suddenly get an idea: we draw a line parallel to one side of the triangle through the opposite corner and now the relations lay open for our thinking. Of course, some more assumptions are hidden, for example: can it be taken as granted that the angle between a line and a crossing line is always the same for all parallel lines? But if we pose this question we immediately know that nothing else except further thinking can help us to answer this new question.

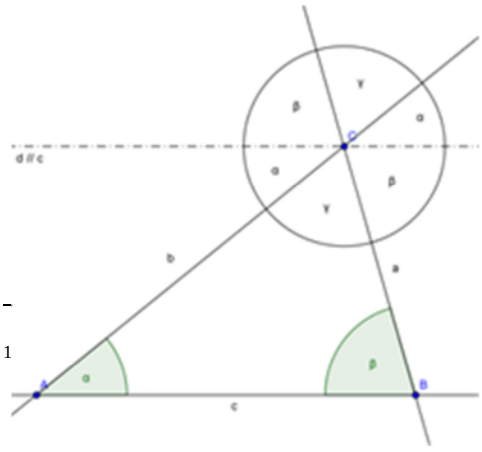

Figure 1 Sum of all angles in a flat Euclidian triangle

Having found a satisfactory solution for our first question, we can focus our attention on the process itself and the validity of its outcome. We are convinced that even we were

thinking as subjects, the result of the thinking is not subjective at all.

If we got the idea with the parallel line or not: this might be some kind of subjective ability. That we posed the question was our deed and as such subjective. But the rules we applied and the result itself have no subjective elements."[192]

We "see with eyes" that the law (the idea) of the sum of angles is fulfilled though we are not only looking but also thinking the whole time. My organization enables me to see the fulfillment of the law – what is obviously a thought, an idea, a concept – together and matching with the visual impression of the drawing. Goethe and his famous interpret Steiner are convinced that all other knowledge has to be of the same quality as such mathematical insight in respect to clearness and absence of intellectual doubt. There are no assumptions, theories, metaphysical propositions or models that might or might not have any relation to nature: "Contemplative judgement" in its various forms reveals the ideas in the objects as perceptions, as something given in the same sense as sensual perceptions are given, not as something arbitrarily added, not as a kind of self-made, subjective thoughts that might or might not fit to sensual perceptions.

As we just saw, this kind of experience is possible in mathematics and in geometry– but is it possible also in respect to "nature"? Goethe said *yes*, Steiner said yes, but it needs some kind of training to acquire this ability[193]; skeptics say *no* because they think it is fundamentally impossible to prove that even the concept of the idea in the objects could be proved and is a metaphysical fiction[194]. This is now the moment to have an eye on the philosophical evolution in western culture.

The loss of confidence in perceptions and thinking

According to Steiner, it was in the beginning of Greek philosophy that Pherekydes *became aware* of the ability of thinking and tried with the help of thinking to overcome mythological concepts. But soon started distrust in the perceptions approximately with Xenophanes: they do not transmit the truth; the sensual organs

[192] Example taken from Klünger, 2016, p. 81f.

19
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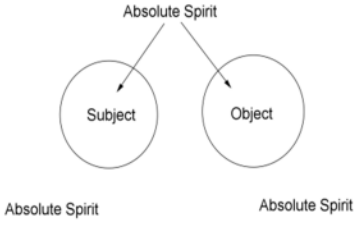

Figure 2The all-embracing spirit; the absolute spirit

mislead the human. Thinking comes to different results as perception. His most important disciple Parmenides found, that human comprehension has two sources: the perceptions and the thinking, but sensual perceptions are misleading, and the only way to true recognition is by pure thinking (Steiner, GA 6, p. 24f). Parmenides declared that thinking and being is the same. The concept behind was the idea of an eternal truth. Perceptions of the world change but the unchanged essence "behind" the perception is the being, and this can be found only by thinking (Wallner, 2016, 10f). Later Plato deepened this view. Only the world of ideas is the true, eternal reality. He was convinced that the all-embracing spirit of the world shows up, manifests in human thinking (Steiner, GA 18, p. 35ff, 70.). And the all-embracing spirit is it that creates the objects and governs their behavior, and if this all-embracing spirit appears in the mind then it shows up as ideas, as thoughts.

As figure 3 shows, the world of the ideas governs from outside the objects. This way Plato tried to show that thinking is able to understand the essence of the objects since thoughts and objects have the same origin in the idea. Wallner considers this as fiction as it is a metaphysical concept:

> "So the 'eternal ideas' are not guiding our thinking but they also guiding the structure and development of the world. It was a beautiful idea, but it was also a fiction; a fiction created to close the gap between thinking and the world we experience. Plato had created the first great metaphysical fiction of Western culture."[195].

According to Steiner, Plato's division between perception and thinking is true only in regard to the ways how recognitions are built. The sensual side is "given", it appears without ideas. The other component of recognition, the ideas, humans have to get out of the reality by thinking, and this implies work, effort. But in nature, there is only one reality and it is due to the human nature that the reality shows up in the form of sensual perceptions and of ideas, that is, perceptions of the mind. The unbiased observer combines both and recognizes reality. Who lost this impartiality believes that his thoughts are coming from a completely different world, the sensual perceptions from the "outside", his thoughts from "inside". And then he starts to doubt how or if his thoughts are in any relation to reality (GA 6, p. 27ff).

[195] Wallner, 2016, p. 11.

Aristotle argued against the Platonist split of the world. Aristotle saw Plato's ideas not outside, but "inside" the objects, as the "essence" of the things. Nature is a uniform, consistent being, and only the human organization is able to separate nature in sensual and mental perceptions. Only in the human mind ideas can appear as if they would be independent entities, but in this independence, they share (owe) no reality (GA 6, p. 34).

"Essence" is a term mostly avoided in modern philosophy because it is difficult to provide a clear definition. However, I use it to draw your attention to the point, for example, what makes a rose a rose so that it looks like and behaves like a rose, growing, blooming, smelling like a rose, being a rose? A possible answer could be that the genes are responsible for this. For the very moment this is acceptable if not only the genes but also all other physical and chemical and biological laws are included because the genes alone could not do anything, they need a complex environment to express themselves. Now take all the specific functions and laws together that are within a rose and take this complex as the "essence" of the rose. It is nearly impossible to doubt that there are such structures "at work", otherwise, we could not explain why roses develop in a regular way and look like roses. Aristotle drew something like a straight line from this structure to his thoughts about this structure: what shows up in mind as idea is just the same as it is as essence of the rose "at work" in the rose. The ideas are the essence of the things, but humans transform this essence into the form of ideas to get hold of the essence. In reality, so Aristotle's opinion, are the ideas in the things, in the world, but the human soul is able to find the idea also in its own depth. (Steiner, GA 18, p. 74).

Of course, also this concept is metaphysically loaded as long as the individual sticks to the imagination that thoughts, because arising "inside" the mind, have nothing to do with reality. For our consideration it is also important to point out here that – according to Aristotle in the interpretation by Steiner -, the ideas can be found only in the "depth" of the soul. This should be clearly distinguished from general "thoughts" in daily life, otherwise – in Aristotle's context -, we should know the answer to every scientific question immediately by just looking at phenomena.

Another reason, why Aristotelian worldview was not generally accepted was its impact on Christianity. Christianity draws a picture of an almighty, infinite God beyond every chance of experience for finite humans. This God as creator made the world but does not exist *in* the world. Both aspects were reasons that Aristotelian philosophy was not accepted in European thinking, as Aristotle saw nature as a

uniform being with the ideas “inside”, and that humans are able to understand the ideas that their minds brings to consciousness – but then these ideas could not be of “divine” quality as God is imagined as a being beyond any comprehensibility for humans.

Figure 3 can also be used to show why it is impossible to ever know *for sure* how the world is: it would need an absolute spirit that is able to recognize the structure of the world and the thoughts of a human, and can judge if they are congruent. Humans are not in the position of an absolute spirit, so whatever they think about nature there is no way for them to acquire *certainty* that their thoughts are right. Furthermore, they can doubt if thinking has anything to do with the structure, the essence of the world. It could be that thoughts are pure subjective representations to make world manageable. History of sciences shows that again and again some concepts that were held true for even long periods had to be abandoned (e. g., geocentric worldview, Newtonian physics, phlogiston-theory, nature of light, to name only a few). Such findings strengthen the position that thoughts are mere subjective models without an inner relation to reality. In contrast, Steiner’s opinion is that only the naive one believes that he is the creator of his concepts and therefore believes that every person has its own concepts, but it would be a basic requirement for philosophy to overcome this naive preconception (GA 4, p. 91).

As Wallner repeatedly and recently (2016) pointed out, all philosophical approaches to guarantee the congruence of being and thinking suffers from metaphysical assumptions. His proposal as given in Constructive Realism is to accept the situation and build models as best as we can. Because of the reasons mentioned before it makes no sense to insist on the “truth” of a specific model. If at a specific moment a model fits to observations then this is in no way a proof that the model represents the “truth” of the reality (Klünger, 2011, 118ff).

On the other hand, as we saw in the example with the sum of angles in a flat, Euclidian triangle: there are situations where we *know* for sure that our thinking is right. We need no “absolute spirit” that provides us with a guarantee that our thinking is correct. Even if this “absolute spirit” would be at hand, we would get into trouble because now the question would arise if we can understand what this absolute spirit wants to tell us. We would shift the question from if we can recognize nature to the problem of recognizing the judgment of the absolute spirit with respect to – again - our thoughts about the judgment of the absolute spirit and the judgment of the

absolute spirit in the spirit of the absolute spirit. How could we ever be sure that we understood the absolute spirit?

Have our thoughts something to do with reality? Is it possible that the same nature that brought humans and thinking into existence could create thinking in a way that it is in no relation to reality and a mere human subjective means to deal with reality? When Constructive Realism considers the Aristotelian concept of "ideas in the objects" as metaphysic assumptions, it does not mean that this assumption is necessarily wrong.

Independently if we share the Aristotelian view, the method Goethe used to look at nature might be a useful alternative to current sciences. Goethe proved that it can be very successful *not* to construct theories and *not* to reduce perceptions to something imperceptible 'behind', but to arrange perceptions in a way that with "contemplative judgment" the idea in the object gets "visible". The scientist can let it open if the idea he or she got was "in" the object or just his own invention, i. e., a "model". The Goetheanistic methodology itself should be useful independently of its philosophical interpretation.

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Picture credits

Fig. 1: Bockemühl, Jochen, 1973, Abb. 2, p. 4-5, by courtesy of Barbara Schmocker, Goetheanum, Naturwissenschaftliche Sektion. (Leaves rearranged in a loop).

Fig. 2: Klünger, Gerhard, 2016, p. 81.

Fig. 3: Klünger, Gerhard, 2016, p. 79.

Gerhard Klünger
Dr. phil., Dr. rer.nat., Researcher for Epistemology, Vienna
g.kluenger@gmx.at

Methodological reflections on the Sakata Model, with a remark on Strangification of Kohō-ha Kampō Medicine

Kōji NAKATOGAWA (Sapporo/Japan)

The main purpose of the present paper is to smoke out the philosophical view of nature seemingly presupposed behind the methodological foundations of the Sakata Model[1]. We will further discuss if there is any similarity between this view of nature and that of Tōdō Yoshimasu[2], who established the methodology of Kampō (漢方) medicine belonging to Kohō-ha (古方派) school which has been developed in Japan since the 18th century. Our considerations here would help us to obtain clearer views of nature commonly and/or implicitly shared by Japanese intellectuals as well as scientists, in general.[3]

According to the Standard Model of the elementary particles accepted today the most fundamental particles are Quarks, and all the other particles are constructed from the Quarks. This Quark model was proposed by Gell-Mann in 1964. The Sakata model was proposed in 1956, and is regarded as a precursor to the quark model. Sakata chose the three hadron particles, proton p, neutron n and Λ-particle Λ, together with their anti-particles, p^-, n^- and Λ-. The particle Λ is classified as a hyperon among hadrons. These hadron particles constitute the most fundamental particles in Sakata model, all other particles were contended to be constructed from them.

His model was successful as far as the meson group of hadrons, is concerned. The following five mesons (π＋, π^-, K+ , Ｋ０, η) are taken for example to show how they are constructed by the three constituent hadrons, p, n and Λ.[4]

Examples of mesons constructed from p, n and λ in the Sakata model:

π＋ ＝ ｐ ｎ—, π^-=np— K+ = pΛ— K^0 ＝ｎΛ—、

$\eta = (p\ p - + n\ n - - \quad 2\Lambda\Lambda -) / \sqrt{6}$

Example of baryons in the Sakata model

p = p as taken to be the first fundamental particle in Sakata model,

n = n as it is taken to be the second fundamental particle in the Sakata model

$\Lambda = \Lambda$ as it is taken to be the third fundamental particle in the Sakata model

$\Sigma^{+} = \Lambda\ p\ n^{-},\ \Delta^{++} = \quad p\ p\ \Lambda^{-}$

As for the subgroup, called baryons, among hadrons, the Sakata model was not so successful. This became clear when the symmetricity of hadrons became to be known.

In 1964, the first generation quarks (u for up, d for down, s for strange) were proposed by M. Gell-Mann and G. Zweig. The symmetricity of the special unitary group SU(3), which is a real Lie group, carried over to these quarks, and the quark model was successful not only for the mesons but also for the baryons. Both kinds of hadrons were shown to be constructed from quarks.

The mesons and baryons taken for examples as above are represented in term of quarks as follows.

Mesons represented in terms of quarks:

$\pi + \quad = ud-, \qquad \pi^{-} = du-,\ K+ = us-,\ K\,0 = ds=,$

$\eta = (uu - + dd - - \quad 2\ ss -) / \sqrt{6}$

Baryons represented in terms of quarks:

$p = uud,\ \ n = udd,\ \Lambda = (1/\sqrt{2})\ s(ud - du),\ \Sigma + = suu,\ \ \Delta ++ = uuu$

One immediately notices that representation of the ηin the quark model is easily obtained from the representation of the η in the Sakata model. The correspondence is

$p \rightarrow u$、　$n \rightarrow d$、　$\Lambda \rightarrow s$

Gell-Mann says explicitly in an interview that he had already known and tried the Sakata model by himself. The video of the interview is available on the internet at the address (see the note)[5]

The representations of mesons and baryons in the quark model were indeed remarkable and mathematically beautiful. Gell-Mann became a Nobel laureate in 1969, not for the discovery of quarks but the classification and interactions of elementary particles.

Quarks were not yet discovered by observation by physicists when Gell-Mann proposed the quark model. The basic three hadrons, p, n and Λ, were already observed by experimental physicists, by the time, when the Sakata model was proposed. Looking at the Sakata model from the methodological point of view, we notice a striking nature of the hadrons p, n and λwhich were purported to construct another particle. These hadrons chosen as the fundamental particles had all been already *observed* by experimental physicists before Sakata chose them as the most fundamental constituent particles.

As a researcher of fundamental physics who used to be educated on the campus in Kyoto, Sakata had wide and deep perspectives in Humanities. The atmosphere of the research group, consisting of Yukawa (Hideki Yukawa, 湯川秀樹, Professor), Shōichi Sakata (坂田昌一, 1911 – 1970, Associate Prof.) and Hajime Tanaka (Assitant), had also contributed to the practice of state explicitly the reasons why a researcher chooses one's own research objectives and methodology. The way Sakata ran his research group in Nagoya was democratic, in the sense that an assertion of

even a student received due attention and respect. This attitude in research had much to do with the spirit of tolerance in Nishida school in philosophy.

Having a wide and deep understanding of methodology and in general, Sakata was tolerant and adaptive to the views having different methodology and epistemological tendencies. After Gell-Mann's quark model was proposed, Sakata's attitude to it was positive and accepted quarks as the fundamental particle from which any other physical objects are constructed.[6] As for Gell-Mann himself, quarks are a mathematical model which makes it possible for theoretical physicists to handle and calculate the behavior of elementary particles constructed from quarks. Gell-Mann did *not* regard quarks as the fundamental constituents of nature from which all the other particles are indeed constructed. Gell-mann introduced the quark model for the purpose of showing how it is handy and simple to calculate and deal with quarks as a mathematical model. During the video interview, already mentioned above, he explicitly states that the quark are intended to be a mathematical model which makes the calculations concerning elementary particles simple. His quark model was a great success and it is indeed simple.

The degree of commitment to the true nature of existence of physical objects are remarkably different between the Sakata model and the Gell-Mann's quark model. The parameters related to the three hadrons can be handled by available observational tools of physics at the time of the proposal of Sakata model. Quarks are not yet observable when they are introduced as a mathematical model. It could be said that the view on the nature of existence of physical objects, presumably assumed behind the Sakata model, is quite different from that of Gell-Mann's. Gell-Mann did not, at least explicitly, commit himself to the existence of physical objects.

Sakata's attitude toward physical nature had been under the influence of Dialektischer Materialismus. He was a leader of a group of Japanese scientists who visited China to attend Beijing Science Symposium held in 1964. He met Mao Zedong [7] and explained his notion of the fundamental particles of the physical world. Mao replied to suggest a new name, Sō-shi (層子, layered particles), for those new particles. and Mao said that he will let Chinese scientists investigate them. The name chosen by Mao for the

fundamental particles in Sakata's sense seems to capture the way they exist. Under the influence of Mitsuo Taketani (武谷三男), Sakata used the term *Jittai* (実体) whose literal translation is substance. His use of the word *Jittai* seems to be slightly misleading from the philosophical point of view. Since Sakata chose only the observable particles (proton, neutron, Λ-particle) to construct and explain all other particles, his methodological stance would come down to explain physical world based on things in the physical world. Putting it epistemologically, he does not seem to have assumed anything behind phenomenal world. If so, this seems to suggest some discrepancy between particles such as proton and neutron, and *Jittai* (substance). Hadrons as *Jittai* (substance) in Sakata's use would be things within the phenomenal world. Figuratively speaking, he explained everything he can touch (observe) by what he can touch. Certainly, Sakata did not belong to the tradition of explaining phenomenal world by assuming something *behind* phenomenon.[8]

Among the alternative traditions to which Sakata might have belonged, one tradition suggests itself. Namely, there is a tradition where nothing but what is seen and touched is relied on. Kohō-ha, developed by Yosimasu Tōdō in the 18th century, is a Japanese school of Kam-pō medicine, a sort of traditional Chinese medicine developed and practiced in Japan. He excluded all the metaphysical presuppositions and imaginative theories from the medical theories contained in The Shanghan Lun (傷寒論, the Treaties on Cold damage Disorders), and re-structured it to form another new theory (Kohō-ha theory) which assumes only observable phenomena and facts. A Kohō-ha doctor helps a patient to re-gain his/her healthy balance of life by using only what is available in nature. His diagnosis is solely based on what he finds by seeing and touching the patient. His choices of herbal medicines are totally based on his physical examination carried out along the line of traditional Chinese medicine, but no referring to theoretical thinking. Kohō-ha's notion of 'shō' 証 is a function from observed data (analog) to a subscription of an herbal medicine[9]. Those who have been acquainted with at least one of the relevant areas, namely philosophy of nature and Kohō-ha Kampo medicine (a sort of TCM developed by Todo Yoshimasu in the 18th century in Japan. It still constitutes a basic part of Kampō style TCM practice today), would likely to find a new field where Verfremdung (Strangification), a methodological tool introduced by Friedrich Wallner[10], would be fruitfully applied.

Endnotes

[1] Model of Shōichi Sakata, 坂田昌一, (1911 – 1970).

[2] Tōdō Yoshimasu, 吉益東洞, (1702 – 1773).

[3] There are a lot papers on the Sakata model, among them, I mention only the following three references, Oku 2007, Hirano and others 2014, and Stefanovich 2010. See the References. As for Kohō-ha medicine and Tōdō Yoshimasu, Terasawa 2012 is recommended as a basic reference.

[4] For details, we refer to Hirano and others 2014, pp.3 – 5.)

[5]http://www.webofstories.com/play/murray.gell-mann/87;jsessionid=A4CC7ECA74BE0F1F57B7456E3D785D78

[6] This rather quick change is quite contrary to Yukawa's stance to quarks. According to Yukawa, the most fundamental things lying beneath all the physical objects are 'prime domains'' (so-ryo-iki 素領域), which was proposed by Yukawa in his very late years.

[7] 毛沢東, see References, Sakata 1964.

[8] The ontological status of what hadrons meant for Sakata himself when he proposed the Sakata model could be clarified further by using Frege's notion of function, which is the last thing close to Cator's notion of set, i.e., a typical and authentic substance. In any event, elementary particles, including hadrons and quarks, are nothing but (compositions of) wave functions.

[9] See references, Ōtuka 2001.

[10] Friedrich Wallner, Constructive Realism: See Reference.

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Kōji NAKATOGAWA

Emeritus Prof. & Dr. , Hokkaido University
kojinakatogawa@gmail.com

Bio Cosmology and Neo-Aristotelism in a Contemporary World

Virtual information links matter and energy: $E =^{i} mc^2$

Rudolf KLIMEK, Klimek, [1] Ryszard TADEUSIEWICZ, Piotr GRANRK

(Cracow/Poland)

Rudolf, Tadeusiewicz[2], Gralek[1] Piotr

[1] Fertility Centre Cracow, Poland

[2]Automatic Control and Biomedical Engineering Chair, Biocybernetics Laboratory in AGH University of Science and Technology, Cracow, Poland

Corresponding address:

Prof. dr hab. med. Dr h.c. multi Rudolf Klimek, Fertility Centre Cracow, Poland

e-mail: mmklimek@cyfronet.pl

Introduction

Medicine is one of those unique areas of human activity in which man is not only the object and also the subject of interest, but primarily connects directly all the theoretical (cognitive) achievements with the art of the possible protection of life and bringing people back to health. This obliges physicians to continuously track the progress of both general knowledge and its technological use. The current information technology, computer simulation technology, and medical imaging techniques allow us to show that some alleged scientific hypotheses which explain the world, but were not entirely proven empirically, now receive confirmation. Once we follow certain ideas which were sown by this observation, we see that information play a significant role in all kinds of processes, including life processes, processes associated with cancer, but also in perinatology, the development of the embryo, and in matters

concerning the origin, development, the phenomenon of life itself. This all starts to come together at this moment. We are already starting to match these blocks together and create a system out of them. It seems that this could be a very important component of a new perspective on issues which have fascinated people for a long time - the issues of life, issues of death, issues of cancer, health issues and ones of disease. It always gives new results and allows seeing relationships where they previously were not visible.

The universe exists due to the eternal, progressively more known and understood natural laws, that is, due to – information, e.g. in the late twentieth century the newly discovered law of natural dissipative self-organization was understood and described [1-3]. Modern physicists' cal this local formulation of the second law of thermodynamics stating that any evil generates the greater good. The simply do not think of evil as something opposed to good, but as a decrease of natural processes in nature, including actions by man or his thoughts. For example, reducing the activity of biophysical and/or biochemical changes in a single cell can result in the risk of a multicellular organism's existence, but can also help to control the further growth of the species in depending on the state of reproductive health, which plays a decisive role in the intergenerational transmission of human life with the participation of information that even can be seen. Each person can immediately see their own informational image by looking in a mirror in which the picture seen (the mirror pattern form) does not contain a single atom of his body, but is only the resonant result of feedback information. The resonance is the condition of a system in which there is a sharp maximum probability for the absorption of energy or capture of particles as well as information, i.e. the power to evoke enduring images, memories, and emotions by the synchronous vibration (action) of a neighboring object or environment.

One can compare the information inside matter and energy with a virtuoso surpassing his students' proficiency and skill. Information is virtual (from the Latin: virtualis - effective, virtus - power, virtue) and is concerned with what is theoretically possible (potential) to occur actualizing the conversion of matter and energy through pure informational resonance, which was first used by Socrates as his method of teaching by question and answer to elicit from his pupils truths he considered to be implicitly known by all rational beings. Virtual reality becomes understood, widely considered as something unreal, since it is morphologically unimaginable, but functionally verifiable. Truth, which is itself a particle of information - is full and

unequivocal at the time of occurrence of any process or structure. Everything which is later linked with this: the description, evaluation and/or the consequences of it - is just zooming in to that new reality. In the same cause of each event from the point of view of teleology there is information in the form of a program or a potential target, awaiting its execution.

Resonance, already described by Galileo, occurs widely in nature in the form of generating all types of vibrations and waves at a distance, for example mechanical, electrical, optical, chemical, electro-mechanical, nuclear and electron. Also, the phenomenon of feedback is an example of information's action, which is found on both sides of the equation of equivalence: $E =^{i} mc^2$ of every cause-and-effect relationship in all events in nature. What more, a man's life is distinguished by the ability for informational self-assessment of the status of their health in an socio-economic environment as described by the universal equation of equivalence in which information (i) is of fundamental importance in the mutual, continuous and spontaneous alternation of matter (m) and energy (E) of the universe, directly and/or indirectly perceived by people ($=^{i}$). Each beginning is real information about the existence of a new being, on the one hand belonging to its source, while on the other belonging to the newly created process or structure, i.e. the organization of intrinsic forces that determine the biological, personal, social and ecological development of a living being.

Human life begins with the formation of the zygote, literally at conception, but the end of man's death is not so clearly defined, although the information in this regard does not pose any doubts. Man is not only figuratively moving from his conception to his death, but his personal life is informationally determined by the reproductive cells, which, during the sexual intercourse, gain the genetic identity of the father via millions of sperm cells lodged in the mother body, only one of which co-creates the nuclear DNA of the zygote. The most important feature of living organisms is not life itself, but the ability for its intergenerational transmission; hence it is important to distinguish between living beings and the universal existence of life from the inanimate world, which is carried out by the same elementary particles of the universe. For example both man and cancers arising from his own cells come from individual cells whose further development, in accordance with the equivalence of matter, information and energy. Cancer is a most complex problem for every man, because according to its psychoneurocybernetic essence it is a natural, although suicidal, advocate of living cells in multicellular living organisms. Therefore,

overcoming cancer is still the subject of academic discussion in order to effectively treat patients with, unfortunately, the still significant percentages of unwanted harmful effects of currently used methods and procedures. The existence of cancer confirms the superiority of life in general over the life of every multicellular organism, since all cancer cells, to sustain their own life, can result in self-organization due to active virtual information [4-6]. Twenty century science brought medicine first of all from the level of biochemistry to the level of biophysics, and than information, and finally biocybernetics. For example R.Tadeusiewicz for the first time showed a picture of entropy which was unimaginable for many people [7-10]. In this way, man has expressed the view upon the world by new cognitive doors opens up completely new horizons. Therefore science came to the conclusion that information is this third component and already accurately described as a phenomenon of resonance. Information is not only a form of cognitive resonance between the sender and the recipient of the news as so-called cognitive compliance, but first of all is the causative agent in many material and energetic transformations [1,11]. The source of information where this information is used, there must develop a kind of resonance. Information is ubiquitous and present in every structure which we observe, whether in space and in animate or inanimate nature. In all these places information begins to function and play an important role when there is someone who receives this information, assimilates it, and bases his actions upon it. It does not have to be a man, and it does not have to be a machine. Currently, a huge amount of information is collected online. The idea is that information is not always traceable as the “move’s spirit”, as an element that makes things run in the direction in which they run, selects one route, and only one route is followed. It is precisely this contribution of information to the matter-energy reality, i.e. a continual transformation of various forms of matter and various forms of energy, but always directed and organized by the component of information described by cybernetics, neurocybernetics, psychoneurocybernetics – all are areas in which we specialize at this time. That allow to create a bridge between the physical knowledge and the issues that concern life, inanimate matter and ones that really show that there is no such barrier between the living and non-living world. There is the continuity of phenomena that are more complex in biological systems, but similar in their essence, all these descriptions which combine psychology with elements of computer science, elements of cybernetics, elements of biophysics. Now, due to the methodology of cyber modeling different kinds of systems through visualization can be shown graphically, multi-dimensionally [8,12-15].

Information

The fact that the nature has an informational character has been known for quite some time. In 1986 J.Dobrowolski and R.Tadeusiewicz have introduced one of the first formal descriptions of informational spectrum of the cell:

$$I^{\square} = < I_1 , I_2, \dots , I_{13} >$$

where: I_1 – information describing cell morphological and functional structure, I_2 – information describing cell genetic resources (DNA in the cell nucleus), I_3 – information contained in mRNA associated with genetic information transmission, I_4 – information contained in rRNA and tRNA associated with cytoplasmic synthesis processes, I_5 – information contained in volume and structural properties of the functional proteins, I_6 – information controlled mitochondrial energetic processes, I_7 – information transmitted from neighboring cells to the considered cell, I_8 – information transmitted from the neighboring tissue to the considered cell, I_9 – information transmitted from the whole organ to the considered cell, I_{10} – information derived from the other organs (including hormonal and neural signals), I_{11} – information transmitted from the considered cell to neighboring cells, I_{12} – information transmitted from the considered cell to other tissues (e.g. angiogenesis) and I_{13} – information transmitted from the considered cell to immunological system [16].

Carcinogenesis causes changes in the indicated processes therefore we can take into account two different informational spectrums: first from normal cells:

$$I^n = < I_1^n , I_2^n, \dots , I_{13}^n >$$

and second for the cells suffered by carcinogenesis process:

$$I^c = < I_1^c , I_2^c, \dots , I_{13}^c >$$

Many interesting and important observations can be discovered on this basis when taking into account particular information volumes (denoted #) in normal cell and cancer cell, for example

$$\#I_1^c > \#I_1^n$$

The cancer cell is less diversified than normal one. It is possible to interpret the information in the context of processes based on computer analysis of diagnostic images. Any increase in the amount of information (for example information associated with an increased degree of order in a structure) reduces the entropy of the examined system, and vice versa. Shannon's definition of entropy is given by the formula

$$H(S) = -\sum_{i=1}^{N} p_i \log_2 p_i$$

where p_i denote probability of the system state or symbol in knowledge (or signal) presented in symbolic form. Such equation is fundamental for whole cybernetics, computer science and communication theory. Unfortunately, biological systems are so complex that a simple definition of their entropy change is not possible. However, one can observe the degree of a system's order using modern medical imaging techniques [7-10]. These techniques can provide direct evidence of the fact that where a tumor interferes with the normal functioning of the control processes associated with normal homeostasis and cell-structure - there one can detect and quantitatively measure an increase in structural entropy. Such structural entropy can be expressed by means of gray level co-occurrence matrix:

$$P(i, j \mid d, \theta) = \frac{\#\{k, l \in D : I(k) = i, I(l) = j, \| k - l \| = d, \angle(k - l) = \theta\}}{\#\{m, n \in D : \| m - n \| = d, \angle(m - n) = \theta\}}$$

where d is selected distance between image pixels which co-occurrence it taken into account, and Θ is selected angle between image pixels which co-occurrence it taken into account. For chosen parameters d and Θ structural entropy can be expressed by equation:

$$H(S) = -\sum_{i,j} P(i, j) \log P(i, j)$$

This example pertains to the survey, which describes the analysis of computer images acquired via computer perfusion tomography of the prostate, performed due to the suspicion of prostate cancer provides images such as shown in Figure 1.

(Fig.1)

(Fig.2)

Images obtained by perfusion tomography of the prostate are shown in Figure 2. These images illustrate; successively: blood flow (BF), blood volume (BV), mean transit time (MTT), and the permeability coefficient (PS). These images allow one to assess the blood flow in different parts of an organ, while the research hypothesis upon which this study is based, determines that flow in the healthy tissue of the non-cancerous part of the organ should be regular and according to the angio-architecture as based on the anatomical structure of the prostate, while the region of the developing cancer the development of the vascular network grows in a chaotic manner - which can be a basis for differentiation. Without going into details, the presentation of which would require complex mathematical formulas, one may be say what follows: the images of the blood flow in the prostate have been analyzed by the computer. Dozens of different mathematical indicators which describe these images have been calculated. And the result was that the parameter which best differentiated cancer from healthy tissue was entropy - a measure of chaos and uncertainty. Figure 3 shows an image of the parameters calculated for all the points of the relevant image. The original image is shown on the left side, while the two maps of entropy for this image (based on the two different directions taken into consideration when creating the so-called matrix are shown on the right. It can be seen that in both cases high values of entropy (marked in red, similarly to mountains on a geographical map) are localized in a certain highlighted area of an organ, in which further research confirmed the presence of cancer.

(Fig.3)

There is a close relationship between the concept of information theory (which refers to entropy) and the medical problem (the detection and localization of cancer). The nature and details of this relationship still require further study, but the fact itself is indisputable. There is a non-trivial connection between life and information, and the disruption of this connection can be the cause of serious illnesses. Therefore, it is essential to examine and understand this relationship, because only in this way our knowledge and practical capabilities can be enriched by the possibility of computer modeling of biological processes. Let us examine Figure 4, which is a depiction of the procedure which is used in the construction and the use of computer models of biomedical systems. First this modeling methodology was presented in book by R.Tadeusiewicz [2].

(Fig.4)

The starting point in creating a model of a system (for example, let us say an organ) is to collect as much information as possible through laboratory tests, but also rely on clinical observations themselves (see items in Figure 4). This information is characterized by a large dispersion (each researcher describes that what most is interesting to him at that moment). Therefore the preliminary action must be a systematization and verification of the collected data. Next, the information collected by different researchers may supplement their individual research, and any conflicts in the data are to be detected and eliminated. After collecting and systematizing the data it is analyzed. Interdependencies are revealed, signal flow paths are sketched, model elements are defined. After completing the analysis, the obtained results and concepts are subject to formalization, resulting in a mathematical model. This model can be programmed into a computer, resulting in an informational tool, which can be used in any number of arbitrarily complex simulation experiments [2]. The results of these simulations need to be collected and again analyzed usually resulting in the discovery that the model allowed us to see certain phenomena which were not noticeable during the experiments at the beginning of the cycle. These findings need to be tested in practice. If these proposals are confirmed – then our knowledge of the object is significantly increased, and can be used in the treatment of patients and in planning further surveys. The cycle closes itself. What more paradoxically, it shows that an apparent failure, due to the fact that the control experiments did NOT confirm the hypotheses advanced on the basis of the survey simulation, is not entirely fruitless. The computer came to flawless logical conclusions from the programmed assumptions. If these conclusions are not confirmed in reality, it means that the assumptions were wrong. These assumptions are the foundations of the theory which we then used to analyze the data from the laboratory and clinical observations in order to build the model. The failure of the model requires the necessity to change the theory, and this in itself may be ultimately more important and valuable than the success of a simulation result being confirmed by a control experiment - as it has already occurred first in neurohormonal, then in the immune strengthening of the mental states of sick individuals.

Informational resonance

Describing the cause of cancer in 1977 was based on the model of cervical cancer [14] and now it is time to present the model of informational resonance imaging to explain to people the resonant image not only as mental, intellectual,

cognitive entity according to the scientific concept of cognitive resonance, because first of all it is a kind of resonance connection, like resonance in electrical engineering, radio technology, or physics. It is based on the fact that there are two objects, two systems, which are synchronized. Activation of one of them causes the reaction of the second and vice versa. This is a feedback loop via various fields, through different interactions, sometimes having the character of forces or patterns, sometimes having the character of, for example, electromagnetic fields. Due to this we can communicate by radio and receive television broadcasts. Resonance is a synchronization of a source with its reactive object. If we talk about our perception of the world and the fact that we can perceive this world more broadly than just in material terms - not only the observable, object, but also some of its projections, some idea of it can reach us – this causes the resonant element to be our mind. Our mind possesses a kind of willingness to create models of the outside world and a readiness to attribute these models to the outside world's real objects in such a way that there would be a coherent resonance with our understanding of what surrounds us, what we're dealing with, for example with the behavior of others, the operation of various types of delivery mechanisms, the functioning of the laws of nature, weather, or phenomena associated with volcanism. We can control this. We don't need to appeal to metaphysics to categorize it, because in our minds there are certain categories, the categories of thought, conceptual categories which can resonate. The real world meets our idea of the world, our concepts, our thoughts, our ideas and spiritual experience. In the area in which this resonance occurs, there occurs discovery and understanding.

Advancing the world's knowledge consisted of scientists creating certain concepts, theories, systems, various types of reference points, and such landmarks. The observation of the real world led to the fact that in these boxes, in the mind of these scholars, were filled with particular types of sensory impressions, which carried information of what was happening in the world. And it was this informational resonance between the information describing the real world and the willingness to receive, understand, categorize and use this knowledge resulted in the fact that we have pushed our knowledge forward. Each such coupling, every time this kind of mutual existence of abstract ideas and their practical application resulted in resonance, science moved us another step forward. If we would only rely on empiricism, our knowledge would be very shallow, because it would amount to phenomenology. We would know what was happening, but not why it was happening. If we only confined ourselves to conceptual action, if we remained only in the realm of speculation, we would only deal with narrow information, but would have no access to the real world,

which could verify our knowledge. Those contact points are the moments when the empirical and the abstract meet each other, fit together like a key and the lock, and thus create a new quality. Namely, knowledge taken from empirical experience and the understanding of this knowledge using abstraction, together create another quantum, which one can use to move forward in the process of deepening, broadening and, above all, utilization of knowledge, because if it is pure knowledge. It is of course beautiful, but does not help us in overcoming certain problems, if we are talking about medicine combined with practical action. And that practical action can be achieved when it is coupled with understanding of information as the decisive factor which carriers e.g. the word in Polish “rak”, which to a Pole enables think about the animal or about the disease. Suppose that everyone thinks about the disease, and if some uses pure information, and saying “cancer” not “rak”, but it resonates only with the person who knows English.

Information is a thing which, in addition to its many other exciting features has an attribute of polymorphism, because may exist in many different forms yet remain itself, i.e. retain its identity even though it may be expressed in different ways in other languages. Information can also operate in a different way, namely, when we consider this quite elementary example, known to every child in Poland: when we ask, what is "Pan Tadeusz" (Mr.Tadeusz). Is it a certain book? No, because there are other editions of this book, and yet they all are the same. Is it therefore a collection of all the books? No, because there exists a film called "Pan Tadeusz". There is a play, there can be a sound recording that the deaf can listen to. Is it a collection of the thoughts of the poet? No, the poet is no longer alive, his thoughts do not exist. What is therefore a literary work? It is information, but it can have very different forms, while remaining the same. And therefore this phenomenon, that the information may also be the driving force behind this resonance (the information field and receiving field) in the person to whom information has been provided and who utilizes this information, which touches a very sensitive, but very important area - the spiritual-material human existence. For example there are psychosomatic illnesses, that there exists the placebo effect, where information leads to a verifiable effect. A patient is treated and recovers under the influence of something inert, but he believes that it is a drug and it works as an element of resonance. In every person there are a number of such resonators, just as a radio is ready to receive many different radio waves. Even if none of these waves are emitted, because there is no broadcasting station that would be sending on such a channel. The radio, however, is made so that it could pick up the signal, even if

physically, at the moment, that signal does not exist. There appears a new station, and the readiness to receive it is there.

Virtual informational feedback (input $=^{i}$ output)

In humans, there are many areas of the psychological structure, which are ready to resonate with various things. It could be the impact of other people, and then there is, for example, a psychosis of the crowd, the effect of bad company, or some other similar thing. It could be the impact of someone who as a patient considers an authority - he comes to the doctor, hears the word cancer, gathers certain ideas and preconceptions via resonance, and may actually die of fear, although he may not even have had cancer. Or he could be effectively convinced that he really was healed from that real or suspected cancer. This shows that the word becomes a causative agent. But it will only be causative if the is an agreement between the person who gave that word or other information, and the person who accepted it, and used it in an appropriate way. If such a informational resonance comes into effect, it can have far-reaching consequences.

However; when it comes to that element of the transition between the realm of the material whose element is a disease, for example, cancer, and the spiritual sphere, which is part of the thought process (the essence of information), the connection is multidimensional. It may be causal in nature, the word evoking something. There is, of course, a reverse relationship - material phenomena, for example pain, evoke specific information response. There is an element which is linked with certain type of changes at the molecular level, or even the sub-molecular one. It may occur that under the influence of certain reactions the direction and course of certain biochemical reactions can largely be controlled by information. All these things connecting together may introduce a whole new field of research, and in the wake of this, a new field of practical exploration. These are very important areas, where people have seen how they easily in a purely informational category talk about medicine and technology in feedback loop. The feedback loops in biology or in technology can be called systems.

Generally speaking, for man, the medical problem we can find different representations depending on what you focus on and what kind of questions we ask. In science generally it is more important to ask a wise question than to find an answer. However, when the biocybernetic approach is considered, it can be seen that it has

another great advantage, and soon we'll get to that feedback loop. When viewed from the point of view of biocybernetics, or general cybernetics - because it applies to of social and economic phenomena as well - we can call any kind of interaction a system. It is a subsystem, where we have certain objects which we can describe. We have interaction - these objects exchange signals, and in a certain way affect each other. In this way a certain system is formed. There can be many such systems. What is important – this feedback loop is a very special type of informational system, the return of part of the output to the point of input for monitoring or self-regulation (input $=^{i}$ output).

First, in the case of feedback of two or more objects, they interact in such a way that the first object influences the other, and the second acts on the first object (hence the name). It closes the circle of cause and effect. There is no beginning and no end everything revolves, back and forth. In all areas of biology and medicine we encounter a large amount of feedback determining that at this point in your and my body we have some balance when it comes to blood pressure, we have a certain level of oxygenation, there is some metabolism, which provides a certain level of glucose, etc. All this homeostasis determines that the internal environment of the human body can maintain harmony and balance despite strong volatility of the external environment. We go out into the cold and into the sauna, changing external conditions enormously, and in the meantime what happens in the body is stabilized. These are the feedback loops. If it is too hot heat loss occurs in one way or another through sweat or, for example, increased radiation. The blood vessels in the subcutaneous layers expand, we turn red, but this way heat is emitted. At a time when it is cold we shake, trembling muscles produce heat and thus we defend ourselves against hypothermia or hyperthermia in appropriate conditions. And these are the feedback loops.

The human mind, confronted with many very different problems, generally can not cope with them well. And therefore we observe phenomenon and analyze them by focusing on certain fragments, usually the most visible ones. We observe it in a behavioral way - this is how it behaves – and we assume, usually incorrectly, that if we change the variable which seems to the most important one, we will solve the problem. The actual problem, which makes complex system phenomena occur in a certain way, usually lies in some unnoticeable feedback loop. Somewhere there is a mechanism of cause and effect, locked in a form of feedback and this informational feedback really stabilizes and regulates it, e.g. somewhere within the system there is small clockwork and it in reality determines what will happen. Therefore

biocybernetics and other such sciences try to find precisely such feedback loops, which govern phenomena, processes or systems. It seems at the moment that it is a very important element in a new way of thinking. For example, physicists have described the universe, the movement of the planets the formation of the universe in the Big Bang - focused on these visible elements. We can see the stars, so we are interested in where they come from. We see the expansion of galaxies and are interested in how it happened. In contrast, suddenly it turns out that somewhere there is dark matter, that what we observe in our most sophisticated astronomical observatories is only a small fragment of reality, while the rest escapes our observation - somewhere out there is the element that is responsible for order of the universe. If we can discover the deepest feedback of nature, it will give us a key to the mastery of various things. Then there appears the hope that, if we influence the most visible thing in our field of choice, it will take care of the problem.

Biocybernetics is a tool, which can cleanse us and isolate us from the superficial material-energetic elements which we can see. For example, a steady decrease and especially an increase in the average body temperature harm the patient who can, in many ways, prevent it. Every doctor knows that if the most visible reaction of the body of a sick child is a fever, defeating the fever itself will not cure the child. The result is that the cybernetic approach, relying on information, an approach which explores the realm of feedback, the most basic elements, the most basic building blocks of a causative mechanism – it can be extremely effective. It will allow us to interact with the real causes of what, on the surface, we see as waves. Each body cell performs additional work using its own internal structures (mitochondria) and thus the organism is kept stable, the optimum body temperature being 36.6^{o} Celsius. Heat is a potent measure of effect on the level of biophysical repair reactions of the body and has been used for centuries to treat many diseases, including cancer not only to destroy cancer cells without harming healthy tissue, but about strengthening the fight against cancer development processes already in precancerous cells, based upon comprehensive medical knowledge. Changes in body temperature are used in the effective prevention and treatment of neoplastic diseases as well as in confirmation of the thermodynamic causes of carcinogenesis, which is mathematically described as the generative entropy in the information equivalence of mass and energy $E =^{i} mc^{2}$ [6,14]. For this the cell uses only the intracellular structures, which are not necessary to maintain their own metabolism, but are producing substances for entire organism. Their mass can be turn on energy necessary to the cell metabolism and ultimately even to self-organize nuclear DNA and sustain its live with

a new genome under these new conditions. Therefore, when the ambient temperature of the body increases again by a few degrees, the new tumor cells must die in the absence of their potential energy sources, which still are the other normal cells own the organism.

Biocybernetic conquest of human diseases

The life of any individual cell ends physiologically with its division into cells of the same genetic type or as a result of dematerialization of its matter into energy needed for formation of new biological structures, among others also to protect only its cellular form even without the possibility of autonomous carcinogenic existence. The aim of zygote is to uphold the species, but the cancer cell exclusively grows in own multicellular organism due to increasing dissipation of matter, information and energy by which it kills normal cells. Thermodynamic evaluation of cell metabolism has allowed separating etiology from the analysis of identifiable pathogenic changes underlying disease symptoms and ailments. However, carcinogenesis cannot be eliminated, but illnesses which are caused by suicidal self-organized neoplastic cells can and should be treated. They can be healed more often by direct fighting the pathogenic factors and indirectly strengthening the whole organism not only through neurohormonal therapy or immunopotentialization, but also using responsible information. For example neogenesis cannot exist without angiogenesis, because the division of neoplastic cells is dependant upon the existing and emerging vessels in their environment determined by the number and the quality of blood and lymphatic vessels. Theirs endothelial cells perform an essential informational role in the metabolism of multi-cellular organisms' dependant both upon the state of neoplastic cells and the endangered organism's own cells [17-19].

Prevention of human cancers and their therapy have happen according to general, not only medical knowledge so that everyone could understand the neoplastic diseases and the primary significance of own life style in the formation and progress of cancer along with importance of caring about the environment inhabited by people. Both structural and energy changes, which occur e.g. in a single cell, are in fact also a change in information of the structures that surround this cell. The thermodynamic etiology of carcinogenesis, which provided new treatment alternatives in the case of standard management insufficiency or failure, is supported by the positive effects of hyperthermia therapy, which itself causes more damage to cancer cells than to healthy

ones [20,21]. The new informational disease (informatonosis) lies in the source of harmful information that simultaneously relates to both an individual and a whole social group to which he or she belongs [11].

In the fight against cancer it is important to both detect and/or delay the appearance of precancerous (dissipathogenic) cells and strengthening the patient's natural defenses of the body against the cancer, through, among others, immunopotentialization - by using vaccines. Cancer cells, compared to healthy cells of the body, can produce enzymes or hormones like such healthy cells, having the same or altered structure and/or function. They can also cease such production, or synthesize completely new biochemicals. These four options allow us to imagine a large number of antigens of cancer cells, enabling us to produce drugs against them. Therefore, the coexistence of symbiotic microorganisms should be used in the production of immunopotentializing vaccines, because they not only interact with labile human cells (e.g. macrophages, leukocytes, lymphocytes and erythrocytes), but, first and foremost for the sake of their own existence, they eliminate from their environment any pathogenic organisms. For example, the lactovaginal vaccine is used not only in the prevention, but also in the treatment of cancer, particularly in precancerous states of the cervix [5,6,15,19,22,23].

Infections of the reproductive system can be found in 10% of women, mostly young ones, using hormonal birth control methods, and of a low socio-economic status. Most infections are mixed ones, and mono-therapy with antibiotics often fails, while the incidents of re-infection still apply to several dozen percent of women treated this way. The lactovaginal vaccine provides a long lasting protection against new inflammations via interaction of symbiotic bacteria. Lactobacillus vaginalis directly competes with pathological human bacteria, viruses and parasites, as is evidenced by the high percentage of healings from infections or even viral inflammations, not only of cervical cancer, in women after beginning sexual intercourse.

In a multicellular organism there usually occurs the destruction and removing of dissipathogenic structures, clinically recognized as precancerous. The cure lies in restoring the full recovery mechanisms of defense and repair of the organism, one of which is of course the immune system. Cervical cancer and the precancerous state which is accurately described as a stochastic and not constant continuum of successive stages of intraepithelial neoplasia - is the result of a natural, multi-factor, and multi-stage process. Both the place of intact epithelium and each of the three

stages of intraepithelial neoplasia (CIN1-3) can be the place where cancer occurs, without intermediary stages. The first cell of cervical cancer as the primary reason for the development of the symptoms of neoplastic disease in women arises from the general process of self-organization of each of the naturally occurring systems (physical, chemical, biological, psychological, social) which, as a result of extreme disorder in its internal state, can not continue to exist in its environment. Every human cell exchanges matter and energy with other cells around it, and in the case of cervical epithelium with bacteria which produce lactic acid. The Lactobacillus acidophilus is involved in cytolysis of the epithelial cells of the vagina, and together with other saprophytic bacteria it prevents the development of pathological microorganisms. Thus it is not only the presence of pathogenic flora, but also the elevated pH and the lack of these rods that indicates an unfavorable environment for epithelial cells, thereby deteriorating the conditions for the existence of the other cervical cells and promotes the growth of a more efficient cell clone.

Immunotherapy, like neurohormonal therapy, belongs to the systemic treatments of tumors and pre-tumor conditions. Unlike local methods (surgical, radiological, laser and thermal), it can be used independent in two general directions: a direct one against cancer, and an indirect one, resulting in normalization, or a sufficient change of environment, where the cancer, in accordance with the laws of thermodynamics, can continue to grow and develop. The indirect therapy has been tested first in the cases of cervical intraepithelial neoplasia (CIN) and works by administering, bi-weekly, three injections of a lactovaginal vaccine, originally produced against trichomoniasis under the name Solco-Trichovac or Gynatren. A single dose of 0.5 ml contains 7 x 10^9 of the non-active form of 8 granular strains of Lactobacillus acidophilus (3 - L.vaginalis 3 - L.rhamnosus, L.fermentum and L.salivarius), which induces the formation of antibodies against antigens of pathological micro-organisms (bacteria, viruses, fungi and other parasites) and does not impair, but even promotes the development of lactobacilli. A normalization of the acidity of the vagina occurs, as well as an increased immunoglobulin epithelium of the cervix and vagina. The efficacy of this treatment has also been demonstrated in cases called nonspecific vaginitis (vaginosis), and the effect is achieved without the need to treat the sexual partner. Finally, the therapy can be used to supplement the normal treatment of vaginitis with a definite bacterial and viral etiology. The introduction of this vaccine for cancer treatment in chronically ill women with hypothalamic-pituitary insufficiency presents a new stage in the fight against cancer, and not only ones of the reproductive organs. As a result of the stimulation of local

and systemic immune mechanisms of the vaginal environment, foreign organisms disappear and the normal flora returns.

Immunotherapy can be compared to the regression of lesions on the cervix of women with hypothalamic insufficiency under the influence of normalization of their state with natural hypothalamic hormones. Women with neurohormonal hypothalamic insufficiency have, cytologically detected, precancerous states in more than 10% of cases, and twice as often when detected via colposcopy. When cervical intraepithelial neoplasia (CIN) was found, it was shown that in 67% of cases there was obstetric hemorrhage, 52% have had a shortened lactation and, 70% of cases showed "erosion". In contrast, in the absence of CIN, patients show statistically significantly less hemorrhage (25%), disorders of lactation (7%) and the existence of erosions (36%). Thus the need for limitation of iatrogenic conditions of cervical cancer, among which there are: infrequent diagnosis and wrong treatment of hypothalamic syndromes and the resulting miscarriages and premature births, excessive births via operation instead of births via the natural method, shortening of post-partum lactation instead of promoting it, or long term use of hormonal contraception, especially among young girls. The removal or destruction of the tumor is only the removal of the effect rather than of the cause, and therefore it is necessary to normalize the environment of the cancer via vaccination, which has also been confirmed during many scientific congresses.

The lactovaginal vaccine affects the environment of the vagina and cervix through strengthening the local and body-wide repair mechanisms without contraindications to its use, regardless of the age of the woman. As a drug it is indicated in all cases of cervical intraepithelial dysplasia (CIN1-3). It also complements any type of cancer therapy and all chronic or recurrent inflammations of the reproductive organs, especially ones with elevated vaginal pH values and/or lactic acid deficiency. Its use should be complemented by supplementation with probiotic solutions containing lactobacilli.

For many years neogenesis was seen in terms of the role of oncogenes, until the proponents of this theory convinced themselves that the unit of hereditary traits consists not only of nuclear DNA. The same goes for the infectious etiology of neoplasm, advertised by individuals believing only in their own ideas, despite tried and tested medical rules. The twenty-first century started with the domination of information. Therefore the modern gynecologic rules in relation to psycho-oncology must accept following prohibitions concerning: 1. Using a cesarean section solely

based upon the wish of the mother as an expression of the lack of sufficient psycho-prophylactic of birth; 2. Inducing the birth solely based upon the duration of the pregnancy, especially when accompanied by obstetric pathology; 3. A reduction of the number of embryos in pregnancies following an assisted treatment of infertility; 4. Treating infertility without taking the health state of both parents into account; 5. Using hormonal systems of contraception for any other reason than prevention of pregnancy, which does not preclude using the hormones in diagnostics and endocrinological therapy. Instead of them the gynecological guidelines should be changed into the following imperatives: 1. Specify the actual date of the birth with an accuracy of ± 3 days with the use of obstetric imaging (USG, MRI) instead of making only a probable estimate using Naegele's rule with the accuracy of ± three weeks; 2. Specify the sensitivity of the contractions of the uterus when determining the date of birth, compulsory before birth induction; 3 Enzymatic monitor the development of the pregnancy and make prognoses as to the birth process, determining maternal blood oxytocinases; 4. Use the ACTH-depot therapy instead of betametazone and dexametazone; 5. Compulsory determination of the new born maturity level instead of solely his/her pulmonary adaptation immediately after each delivery. For exmple the most effective treatment lies in demonstrating the results of those doctors who, in accordance with nature and their professional calling, achieve a low perinatal mortality (2.2‰) with 16% of cesarean sections of all births. In the year 2012 in the hospital of Trsten in Slovak Tatras it was noted: 46 infants born as premature children according to the criterium of the length of the pregnancy before 37 weeks, in which 30 had a mass ≥ 2500g, therefore fulfilled the classical lower limit of foetal maturity and a whole 14 of them also had a body length ≥ 48 cm. This stays in accordance with the results of prospective examinations of over 56 thousand births in an adjacent part of Poland, in which the two mentioned criteria were fulfilled by only 2.5% of all infants [6]. During the 30 years' activities of Medical University of Toruń held 69366 births, of which 11814 by cesarean section (17.03%), covering the period 1980-2009 a steady increasing number of cesarean section performed from 9.35% to 28.13% and reduction in procedures using forceps from 1.5% to 0.63%, and a manual assistance from 3.5% to 0.63%. No one was performed according only to wish of mother without obstetrical indications [4].

Also half of all recurring miscarriages still surprise obstetricians, who not only do not use enzymatic monitoring (with the help of oxytocinase) which has been known for fifty years, but also do not examine the essential hypothalamo-hypophyseal-adrenal axis [24-27]. They use excessive gonadotropins, but do not

underestimate the meaning of adrenocorticotrophin (ACTH), or even block it with synthetic steroid drugs without determining the ACTH levels in the blood of the mother. Moreover, they justify the excessive number of induced and operative births by the accumulation of pathology in their obstetrics units, which they often cause themselves. The best example of which is the endometriosis in abdominal epithel scars after cesarean sections which were performed too early before the tolerance of the foetal tissues of the mother's organism ended.

Conclusions

The most commonly known historical incident involving deformities caused by producers of pharmaceuticals and medical equipment is the birth of children with deformed or missing extremities as an effect of ingesting only a few tablets of Talidomid during pregnancy, primary advertised as a safe drug against nausea. This serves to remind that in the last few days of the child's life inside the mother many processes occur which are essential to the beginning and ending of the birth process in the span of 24 hours. A lack of responsibility is demonstrated by setting the date of birth based solely on the date of the last period. Neglecting giving birth in the correct moment can be compared to the harmfulness of Talidomid in the early pregnancy, with the difference that the cause of injury to the child is not from a specific drug with a proven harmfulness. In both situations a time frame of only a few days is involved. In the first case, one can prove the fact of administering or ingesting the harmful substance. In the second case it is difficult to determine the individual responsibility, although the harmfulness of statistically, medically and demographically documented cesarean sections done without medical indications, iatrogenic premature births, and prematurity not justified in a specific medical situation lies beyond doubt. They can be substantially lowered through the individualization of medical care, using common methods of increasing the precision of predicting the date of birth, or as simply and easily as the counting of Apgar points, determining the level of foetal maturity of born children, so as to document the correct choice of the date of birth in an objective way [18,24]. Already it was Aristotle (384-322 B.C.) who taught that: “All creatures have their determined time for giving birth and carrying fetus, only a man is born all year long, not in determined time, one in the seventh month, the other in the eight, and so on till beginning of the eleventh month”. Therefore, present psycho-medical monitoring of pregnancy and predicting the correct birth-date constitutes one of the lasting achievements of contemporary human knowledge but the decisive health

improvements can be achieved only by simultaneous medical and psychological cooperation as well as constant self-education of all people. Hence not surprisingly, the Renaissance artist's representations of skeletons and human anatomy were better than of the first anatomists. Leonardo da Vinci (1452-1519) was the first artist to consider anatomy for reasons beyond his practicality in depicting the human form, but for the first time he introduced the quantitative outlook in the growth of the fetus in utero till 19 months after birth. In his Quaderni d'Anatomia (Eds. Vaugensten, Fohnahn and Hopstock, 6 vols, Christiana 1911 Dybwad) he stated: "the child grows daily more when in the body of its mother than when it is outside of the body, and this teaches us why in the first year when if finds himself outside of the body of the mother, or, rather, in the first nine months it does not double the size of the nine months when it found itself within the mother's body. Nor in 19 months has it doubled the size it was nine months diminishing the quantity of such increase till it has come to its greater height". In summary we can conclude that even nowadays there are many a la Leonardo da Vinci information, fortunately coverless but still too often not seen, heard, red or correctly understood and used.

Modern medical means as ultrasonography devices, cardiotocographs or neonatological incubators from the technical point of view stems from the greatest advances of quantum mechanics, theory of relativity and biocybernetics. Unfortunately, their use in obstetrics sometimes paradoxically leads to iatrogenic morbidity and mortality due to lack of understanding of fetal maturation and relativity of calendar pregnancy duration. Medicine which is focused only on pathology does not fulfill the requirements of the modern perinatology, which points to the necessity of using the entire human knowledge and does not allow to change physiological events into pathological ones. Both the prophylaxis of premature labors (which belongs to pathology) and non-interference with natural gestational processes (physiology) through unnecessary labor induction or cesarean section at a time improper for individual pregnancy are more important than later treatment of premature new borns. Labor at an improper time is a common obstetrical error, especially one week before true individual term as consequence of its iatrogenic induction. By means of the existent ultrasonography devices on the basis of two measurements within $\geq$2 weeks the obstetricians not only assess the current maturity, mass, length and gestational age of the child, but also predict those values in the perinatal period. It brings measurable medical, social and financial profits and - most importantly – discards the ethics of reticence on the dangerous dominance of technology over general knowledge. This is the best way to bring the percentage of

premature birth down to the natural limit of 2.5% of all deliveries. Currently, 10-18% of labors are induced prematurely only because the calendar time of pregnancy duration has exceeded 287 or 294 days from the date of the last menstrual period, which additionally is given by the mothers accurate to several days, anyway [24,25]. The reduction of perinatal mortality – sometimes wrongly ascribed mainly to obstetricians – is primarily an effect of the amazing progress in neonatology. Low birth weight, perinatal mortality and prematurity rate have been even adopted as general social and economic indices of development of entire countries or at least selected territories. Therefore, to bring out the role of obstetricians there in, one should permanently introduce two other clinical criteria: distribution of birth in the range of six-week norm of occurrence in humans and ratio of premature infants to the mature ones at the gestational age [26,27,31]. After reprogramming of ultrasonography biometry as well as revitalizing of enzymatic monitoring of pregnancies, there is a moral imperative to evaluate fetal maturity of newborn infants immediately after their deliveries. Such individual evaluation of each delivery ought to be performed directly in obstetrical ward not only by routine assessment of the adaptation of the newborn in Apgar scale but also of its fetal maturity according to new index of fetal maturity, what is particularly important in the case of instrumental deliveries [25].

Virtual informational resonance is a synchronization of a source with its reactive object and may exist in many different forms yet remain itself. Information is not only a known form of cognitive resonance between the sender and the recipient of news, but first of all it is the causative agent in any material and energetic transformations, when observed are in themselves sometimes not fully understood. Human mind possesses a kind of willingness to create model of the outside word and a readiness to attribute these models to be coherent resonance with human understanding of real word. Consciousness can access patterns of information that simply can not have been acquired via the usual channels of the senses and it may sometimes function independently of time and space. The relationship exists between consciousness and body states as a form of informational resonance. Until the 20^{th} the century the mind and body were considered to be separated; however in the 21^{st} they are integrated according to equation of material-informational-energetic equivalence $E =^{i} mc^2$ [1-5]. Informational resonance is the driving force not only in the person to whom information has been provided and who utilizes this information, what touches the spiritual-material human existence. In the case of informational feedback of two or more objects, they interact in such a way that the first object influences the other, and

the second acts on the first object, what closes the circle of cause and effect. There is no beginning and no end, everything revolves. The current universal pattern (occurring in the present) takes priority above those past and future states to operate efficiently. It is very likely that if people knew what was occur in the future, they would change the patterns of behavior, but they might not be able to full fill their functions as parts of a wider whole as the individual organisms of society, i.e. considered as conscious live organism in its own rights [29-35].

Conflict of interest

We confirm that this paper content has no conflict of interest.

Disclosure

This paper is an update of previously publications: “Explained cause of cancer” (6), Psychoneurocybernetic conquest of carcinogenesis and cancers” (4) and “Prevention of iatrogenic cervical cancer” (15) and “Live, cancer and virtual information” (in press)

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Rudolf Klimek, Prof. Dr., Fertility Centre Cracow, Poland
Richyard Tadeusiewicz, Prof. Dr.,Automatic Control and Biomedical Engineering Chair, Biocybernetics Laboratory in
AGH University of Science and Technology, Cracow, Poland
Poland Piotr Granek, Fertility Centre Cracow, Poland
mmklimek@kinga.cyf-kr.edu.pl

INDIVIDUAL AND GLOBAL CHALLENGES IN INTEGRATING BIOS

Hans-Martin SASS (Bochum/Germany)

This cosmos of bios is integrated and integrating; no individual form of bios can exist separately. Bios according to Confucius is 'he er bu tong', i.e. 'in harmony but not identical', '*in harmony as well as diversified'*[196]. Individual persons have their personal DNA, but we share the basic building blocks of life with all other forms of the zoon world of bios. We humans share the bios property of blood with other forms of animal bios, but it would be deadly to transplant animal blood to humans. Actually, we humans as well have different types of blood as Karl Landsteiner 1901 in this university described[197]. The application of Landsteiner's research since has saved millions of lives by blood transfusion and allowed complicated surgeries. The Confucian wisdom comes close to the insight of enlightened European Rabbi Moses Mendelsohn: '.[198]

In this presentation I discuss (1) the integrated and integrating structure of bios from the multiverse bios to the microbial colonies interacting with animals, plants and humans, and to bios interactions in smaller and larger biotopes, (2) the new additional forms of bios developed and cultivated by specific properties innate to our human species, and (3) the bio-ethical and bio-cultural challenge to protect bios and to prevent destruction and disaster.

1. **Individual bios is terminal but the stream of life goes on**.

My grandfather and my grandmother did have grandparents and I would not exist without them, nor would my grandchildren exist without my wife and me having been involved in procreating life. My grandparents and parents are dead, so is my wife; sooner or later I will be dead as well. Different cosmological models try to explain how and why universes and multiverses became alive, interacting, expanding or contracting, and why and how black matter, solar systems and stars are born and are

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[196] Confucius 'Lun Yu' 13:23; quoted and applied to the 21th century intercultural scene by Zhai XM 2011 Diversified but not identical. Harmonizing International Guidelines with Cultural Values and National Traditions, in: Asian Bioethics Review 3(1)31-35

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dying. We humans ponder with our terminality and search for and find answers and solutions in religions and metaphysics. Biological evolution has created myriads of species on this earth and continues to do so; many life forms also have disappeared depending on unfavorable environments for their living and prospering, modifying and adjusting. Biotopes in different shapes and with different participants have been developed, expanded and changed or disappeared depending on their internal coherence and the capability to keep a more or less harmonious balance as integrated living beings.

Similarly, a great number of different forms of social bios among us humans in clans, classes, companies, corporations, cultures and countries were developed, prospered, survived, destroyed others or were destroyed themselves. It would be helpful to politicians, business leaders, and sociologies to recognize this particular integrated bios in human culture. This globe had been a fiery ball some billions of years ago and had survived ice ages; day and night and local climate define differences and its seasons change. The new bios of our world of urbanization and agriculture, of the internet of people and of things is not the world of our grandfathers anymore. Thus, bios, cultivated by humans, goes on in different ways, and we might better understand and revolutionize social sciences methodologically, if we would recognize social life as bios. And while individual life is terminal, we humans have created narratives, books, sciences, knowledge, spiritual aspirations and insight, religions, which are passed on from generation to generation as collective memory, experience, and orientation. They have become a specific property of the human bios and how it relates to individual terminality and to the ongoing cosmos of bios in general.

All individual bios and biotopes are integrated into the great integrating bios; they as complex adaptive systems (CAS) themselves form together the complex adaptive system of bios. No life can survive without other life. I cannot even stop my breathing for five minutes, because my cells need oxidation to keep my heart, organs, brain and spirit alive; I cannot go without water and food, or without sleep, for more than a few days. There are other conditions of bios which I cannot change such as the seasons, the specific climate of my geographical position; so I have to adjust to these elements by building houses for shelter, wear warm clothing in cold climates, use electricity at night and for heating and cooling houses and rooms, for running machines. – But other features and properties of bios can have been changed by cultivating humans. Traditional farming, vertical agriculture and genetically modified plants and animals, production and delivery networks of information, goods and

valuables define our integrated modern world of civilized bios. Formal and informal social, legal, and political networks, including government, police, hospitals and military forces are valuable and necessary elements of our human bios.

My individual bios and that of my family, neighbors, friends and colleagues depends on these integrated biotopes and their functioning. But my life and well-being and well-feeling also depend also on the good integration with the small worlds of microbes in and around me, the billions of microbes in my gut helping me to digest, to protect me from pathogens and allow me to live in more or less healthy probiotic harmony. While I cannot do much about the changing bios of the seasons and climate, I can protect, modify and improve the microbial bios in and around my body by nutrition and lifestyle. I also can and must be actively involved to protect, develop and cultivate the social, cultural and political biotopes I cannot avoid to be involved in: my family, my job, my neighborhood, my culture, my country, and all other biological and cultural biotopes I am a part of. – Clans and neighborhoods, companies and corporations are living beings with a will to live and to survive, contributing valuable or less valuable services and goods to our collective bios; sometimes these collective or corporate persons will hurt the harmony of our integrated bios for their own short-term selfish benefit by violating written or unwritten laws and rules of decent culture in cooperation and competition.

2. **We humans are actively cultivating our specific human bios and biotope**.

Different to other species we humans are '*unfinished living beings* (Mangelwesen) ' as Arnold Gehlen tried to explain. When we compare ourselves to other species such as wolves or bees, who act out of instinct, or to plants and trees, who all have their very specific properties for survival in a specific biotope, we lack these highly defined specialized properties. Inherited properties of different species will allow for their survival; we humans have to train and to cultivate them for improved usefulness. Our human predecessors most likely lived in a specific African jungle tree-based biotope, but they did not stay there, rather migrated over many 10.000 years to most other places of the globe and in doing so modified and cultivated their specific human properties and their new biotopes.

Cultural anthropology allows us to identify certain human specific properties used during the course of history by our predecessors to survive in most any climate and season, to build houses and temples, to form communities with stability and with harmony, to integrate a wide variety of competence, cooperation and competition, and a diversity of individual and collective world views. As a group-and-clan based

species we humans are gifted with the properties of communication and cooperation and learn and experience both from the early days of childhood on. But as different individuals excel in certain practices over others, competence and competition give rise to divisions of labor and expertise, which become a defining mark of larger successful and more coherent communities such as in cooking and hunting, producing weapon and machines, working in science and technology, knowing and developing medicinal remedies, providing wisdom in leadership and arbitration. Part of the property of the 'unfinished living being' is probably the need to go beyond what is here and there, i.e. to contemplate about what is not seen but might be there, also to calculate how to do things better and how to integrate visions and intuitions into communication and cooperation in competition and competence. The same is finally true for the properties of compassion and cultivation, both seem to be an essential innate property of our species, from the first appearance of compassion of a mother towards a baby and of those who have towards those who have not. Benefits, enjoyments and harmonies in the exercise of the *8-C properties* are evident in all complex adaptive systems of bios, but they find their species-specific expression in human culture, society and life.

All of us are endowed with these 8-C properties and each of us will develop and apply them in different and very personal ways, in support of harmony and happiness or in destruction and exploitation. All eight properties are endangered by abuse and mishandling for short term egocentric gain by individual or corporate persons, and political and cultural history and our own times are full of examples of broken communities and the destruction or implosion of previously relatively well integrated complex geographical cultures and the appearance of new cyberspace cultures which yet have to find their specific culture and to demonstrate their contributions towards the improvement of the natural and cultural bios of our modern worlds. Given the age of our cosmos, it was only an extremely short way from our ancestor clans living in African trees to the high-tech and internet integrated cultivated human bios of today. We humans are inferior to the acoustic skills of bats in orientation, the olfactory skills of dogs, the eyesight of predatory birds, the skills of migratory birds. We recognize, but don't understand, the DNA knowledge of individual bios of egg, larva, and flying insect of butterflies and cicadas, some cicadas having subspecies-specific years of dormant egg life. But we humans have other properties which make more than up for these deficiencies, actually make us superior in skills and their further development, as the man-made modifications of the global bios demonstrate. The properties which enable us to transform wilderness into

cultivated landscape and integrated cities can be detected and described in cultural anthropology. An extended and detailed history cultural anthropology would identify the essential importance of eight properties, in their combination and intensity specific for our human species as it has developed.

Let us define more specifically these eight human-specific properties, the use and cultivation of which have allowed us to build the relatively healthy and happy integrated human bios of today. First there are *Communication* and *Cooperation* as necessary conditions for group based clans, communication by body language and sound language, by books and oral traditions, cooperation in division of labor, bringing up the next generation and protecting the clan. Then there are refined skills in *Competence* and *Competition* in providing expert services to the group and doing so by ever improving a specific expertise in completion with others who also strive for success and social recognition in the group. Given the open and unsettled human bios, *Contemplation* about our own destiny, fate, life and afterlife, God and the world, angels and devils seems to have been with us for a long long time; so has *Calculation* as a property to figure out the best way to do things competently and competitively, but also to respond to perceived requirement such as following divine commandments or to bury and to remember the dead, or make the best out of laws and regulations and of social and cultural norms. Lastly I mention *Compassion* and *Cultivation*. Compassion seems to be an essential heritage centered on longtime childhood, lovemaking, and protection and care for the weak members of the clan. All these properties culminate and integrate in a unique and human-species specific model of Cultivation, the rich variety of realization we find in cultural, social, religious, and political traditions.

The basic information and guide for cultivating these *8-C's* is the reciprocal Vedic slogan 'tat tvam asi' -this is also you: the microbe, the cosmos, the water, the hungry neighbor, the dying flower in the vase. The same insight is expressed in the Bioethics Imperative of Fritz Jahr, who coined the term bio-ethics in 1926: 'Respect every living being as an end in itself and treat it, if possible, as such!' These 8-C's have been confirmed in many religions and philosophies and thus may give social and ethical requirements of today a strong backing and an extra support. From the earliest prehistoric days of humans thinking about the central powers of bios, movement, interaction and integrating, 'change' and 'interrelatedness' such as in the eight-times-eight powers and their modifications and collaboration in the *I Ching* (The Book of Change) given by the mythological world ruler Fu Xi, a dragon with a human face, change and interaction have been used to describe the taxonomy of the universe, to

guide wise rulers and heroes in culture, science, peace and war. There are many ways wind and water and all other infinite applications of the hexagrams of the *I Ching* will interact; the same can be said for the infinite combinations, integrations and interactions of the 8 C properties. Many species could not make it in the changes of life: the Woolen Mammoth in Siberia could not adopt to a naturally changing climate and the Spotted Owl in the woodlands or Oregon might not be flexible enough to survive man-made environmental changes by the lumber industry. Mice and lice can much better than the Woolen Mammoth and the Spotted Owl adapt to changing biotopes, but we nevertheless don't tolerate them in our homes, hospitals and offices; that is their problem.

3. Risk to the expanding man-made cosmos and the instrument of bio-ethics.

Our universe together with the multiverse might be expanding or not; but that is of no big relevance for our own individual or collective bios. However, the expanding bios of science and technology, electricity and globalization, of new worlds of social and commercial websites on the internet, of new ways and means of warfare and destruction warfare opens new dimensions for doing good or doing bad, for winning or losing individual and collective culture, health and happiness. I just mention half a dozen different risks to our civilized human bios today out of a much larger group of potential disasters.

A first risk is destruction coming out of the surrounding cosmos by asteroids; such disasters very likely have happened before and extinguished much life on our planet, but we cannot do anything about such a risk. A second risk to integrated bios of modern civilization and culture might come as an electromagnetic pulse [EMP] naturally via gamma radiation from the sun or via selective warfare by EMP canons or by exploding nitrogen bombs in high altitude; our modern human bios, as far as it is based on microchip technology, will be destroyed, all other forms of bios will continue to prosper and will modify into a new integrated bios without humans and human culture. A third thread to the modern bios of integrated human culture would be the poisoning or destruction of essential operating and controlling digital networks such as formerly invading enemies have poisoned water and burned crops and vegetation. A fourth potentially great threat to our modern of bios might come from microbial disaster via antibiotic resistant microbes unintentional in an age of integrated global travel or intentional by individuals or states, also via specifically engineered killer microbes; this form of evil destruction carries the risk that, once released, the microbial pandemic might be difficult to stop or end. Similarly, a severe

disease among insects pollinating plants, trees and crops in the food chain might fall victim to hazardous pesticides or deadly microbes; in certain areas of the world the number of honey bees has been reduced by 80% over the last 10 years.

Finally, much talked about in science fiction narratives is the threat to our civilization from artificial intelligence turned against the existing balance of interaction and interdependence among the wide modern world of bios. Not much is know precisely about systems of mad and aggressive artificial intelligence turning outside of their sphere, running rampage and destroying all or some integrated forms of in the world of modern human bios, such as mad and aggressive individuals today cause destruction by killing fellow humans with traditional explosives or deadly infectious microbes. - Well-functioning digital and microbial infrastructures are essential for the survival of the bios of our modern culture and make this new complex form of bios vulnerable in new dimensions.

What is the role of bioethics within the multitude of religious and philosophical traditions and cultures? Is ethics just an application of specific religious or philosophical worldviews or of public law and governmental regulation and how can civil rebellions against existing laws be understood? I suggest that it might be the other way around: worldviews stabilize and support cultural and moral behavior, they don't conceive or invent it. Certain forms of social and cultural behavior, based on the human-specific 8-C properties most likely are innate, and their application and cultivation have been essential for the survival and biological success of our species in the 'struggle for life'. In his dialog with Euthyphron, 2700 years ago, Socrates[199], argues that *the Gods don't like good deeds because those are based on divine laws and rules, rather because they are good in themselves;* i.e. we would say, because they approve the healthy, cultivated and successful application of the 8 C's in prudent integration and application. Would Socrates' insight allow us to review the wide cosmos of worldviews from the point the innate ethics of bios in surviving and in living and surviving well, happy, and healthy? If we would follow Socrates, then we might speak of a 'ethos spermaticos' as a biological property more or less inherited and applied in human history and most likely supported by a 'logos spermatikos', distributed and alive in various cosmobiological quantities and intensities over the centuries and in different individual and collective cultures. Jesus, when tricked into a debate about God-given rules in Mosaic law, avoided an inflexible response and rather stressed the flexibility of the 8-C's beyond man-made or divine laws: 'love God

[199] Plato, Euthyphron

and love your neighbor', i.e. give respect to the highest integrating bios and help your fellow living being as your next neighbor. Jesus was well versed in Mosaic law and religion, but he refused to go into the specifics of laws and orders, rather focused on respect and recognition of the 'higher order', i.e. the God as understood in Rabbinic tradition, requesting the recognition of all and other forms of bios, i.e. the 'neighbor'. The Vedic slogan *'tat tvam asi'* and Jesus' *'love your neighbor'* are just other expressions of Jahr's 'bioethics imperative'. They are results of contemplation and calculation for the purpose of protecting and furthering cultures in teaching competence and completion, communication and cooperation. Religion and weltanschauung have served and do serve as stabilizing factors for highly complex adaptive systems, but they also can become destabilizing factors as we see today in non-communicative aggressive sectarian movements based on religious or racist ideologies.

There had been centuries when Christians persecuted, tortured, and killed each other for disagreements over the essence of the Holy Trinity, the transubstantiation of Wine and bread in Holy Supper; in the course of technological development exploitation and corruption has occurred and still occurs and calls for revolution were and are associated with alienation; today we recognize dogmatic fights within Islam and from Islam towards 'infidels' in association with geopolitical visions. Injustice in distribution and exploitation has been reduced in most developed countries; Christians rarely fight about dogmatic differences any more. Would Jesus have fought for one or the other position regarding the teaching of Holy Trinity, Holy Supper, and the relevance of the Nicaean Creed of Emperor Constantine of 325 BC. Would Jesus be interested in those debates at all or would he respond 'love God and love your neighbor, that all'. Would Buddha be interested to get involved in the different specific or sectarian interpretations of spiritual transition or seelenwanderung or discuss, how many and which unseen worlds, Gods and Goddesses and spirits there would be and what their character and their relevance to us would be? Can such old wisdom be dressed in new clothes for new challenges of the expanded cosmos of bios or do we need new and different guides for different biotopes? Or do we need new orientational models for the new bios worlds of high-tech, globalization and the internet or do we have already proven wisdom established and experienced in different cultures also for the 21th century? In order to answer this question, we may consult survival guides in occidental and oriental cultures and the already mentioned wise men Lao Zi, Buddha, Jesus, and others.

Here is a classical Confucian biocultural narrative on the Great Harmony of cosmological and individual and communal bios which we may translate into the future worlds of globalization, high-tech and internets of the 21th century and beyond [200]: *'Heaven is my father and Earth is my mother, and even such a small creature as I find an intimate place in their midst. Therefore, that which fills the universe I regard as my body and that which directs the universe I consider as my nature. All people are my brothers and sisters, and all things are my companions. - The great ruler (the Emperor) is the eldest son of my parents (Heaven and Earth), and the great ministers are his stewards. Respect the aged; this is the way to treat them as elders should be treated. Show deep love toward the orphaned and the weak, this is the way to treat them as the young should be treated. The sage identifies his character with that of Heaven and Earth, and the worthy is the most outstanding man. Even those who are tired, infirm, crippled, or sick, those who have no brothers or children, wives or husbands, are all my brothers who are in distress and have no one to turn to. -When the time comes, to keep him from harm, this is the care of a son. To rejoice in Heaven and to have no anxiety, this is filial piety at its purest. - He who disobeys (the rule of bios) violates virtue. He who destroys humanity is a robber. He who promotes evil lacks (ethical) capacity. But he, who puts his moral nature into practice and brings his physical existence into complete fulfillment, can match (Heaven and Earth). - One who knows the rules of transformation will skillfully carry forward the undertakings (of Heaven and Earth), and one who penetrates spirit to the highest degree will skillfully carry out their will. - Do nothing shameful in the recesses of your own house and thus bring no dishonor to them. Preserve your mind and nourish your nature and thus (serve them) with untiring effort. - Wealth, honor, blessing, and benefits are meant for the enrichment of my life, while poverty, humble station, and sorrow are meant to help me to fulfillment. - In life I follow and serve (Heaven and Earth); in death I will be at peace.'*

And here is the prayer with similar biocosmological-bioethical structure, which Jesus has taught his disciples: *'Our Father in Heavens, hallowed be your Name. Your Kingdom come, your Will be done, on Earth as it is in Heavens. Give us today our daily bread. Forgive us our sins, as we forgive those, who sin against us. Lead us*

[200] Chang Tsai (1020-1077) The Western Inscription, in: A Source in Chinese Philosophy, Chan WT ed., Princeton University Press, p. 497-498, 1972; for the role of ritual in 'recovering' the original property of the 'Great Harmony' of bios in Confucian reasoning cf. Chow KW 1993 Ritual, Cosmology and Ontology, in: Philosophy East and West 43(2)201-228.

not into temptation, but deliver us from the Evil. The Kingdom, the Power and the Glory are yours, now and forever. Amen.'[201]

How would Lao Zi, Buddha, Francesco Assisi, Immanuel Kant, Karl Marx, Albert Schweitzer, Fritz Jahr, Deng Xiao Peng respond to such a 1000 years old Confucian biocosmological and bioethical contemplation or to the biocosmological and bioethical dimensions of Jesus' prayer? Can we translate both into our world of bios, its protection and cultivation, and how should we do it? Could all of them, including Confucius and Jesus, agree to Deng Xia Peng's Golden Rule thesis '*it does not matter whether a mouse is black or white, as long as she catches mice'*. I think, that these religious authorities would support the atheist version of Deng's Golden Rule. - Karl Marx, in order to fight disaster and destruction within the industrializing societies of Western Europe in 1848 wrote the Communist Manifesto culminating in the call 'Proletarians of all Nations unite'. Now, at the beginning of the 21th century we have other problems. All parties involved those days in the 19th century used the 8-C properties more or less successfully and workers in Britain and Germany are doing quite well. But natural and cultural biotopes and social and political harmonies are threatened quite differently today on a much larger and global scale. May we translate Marx' Communist Manifesto into a Biocosmological Manifesto for the 21th century and say **'***Biocosmologists of all Disciplines, Cultures, and Countries*

[201] Matth 6:9

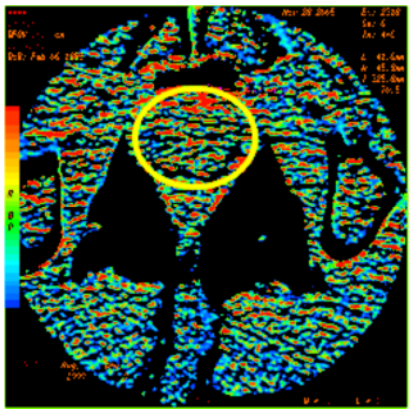


Fig. 1. An image obtained via perfusion tomography of a male small pelvis. The highlighted oval area corresponds to the anatomical location of the prostate.

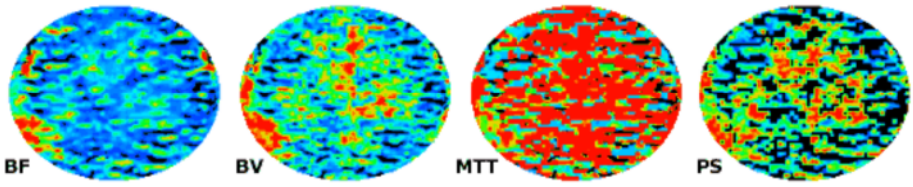


Fig. 2. Medical images of perfusion tomography of the prostate.

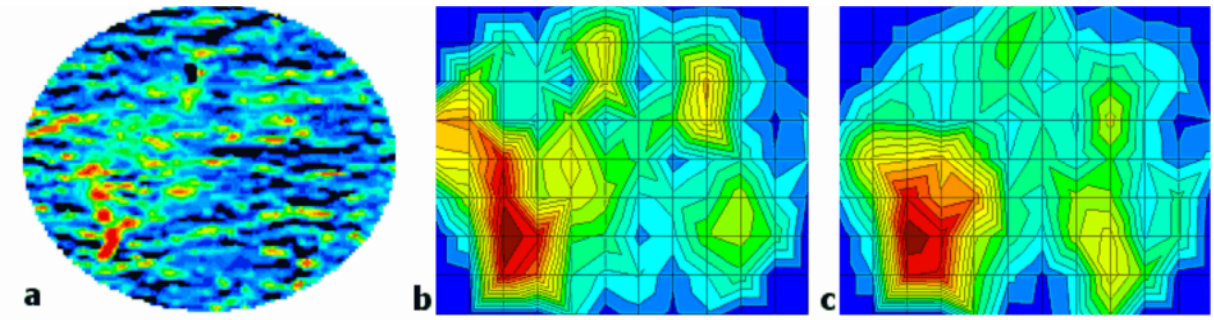


Fig. 3. An image of perfusion tomography of the selected prostate cancer and two maps of entropy values determined on this basis.

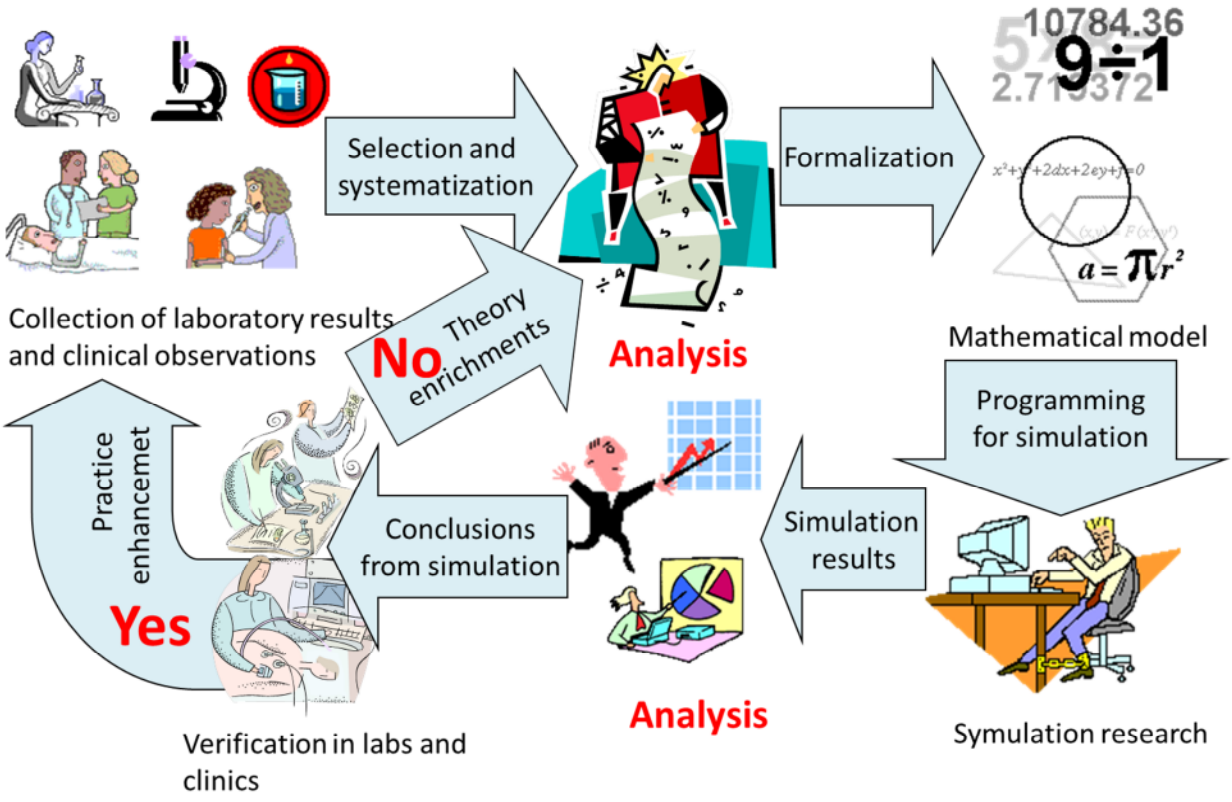


Fig. 4. Methodology of computer modeling of biological systems (description in text).

Hans Martin Sass, Prof. Dr.
Ruhr University, Bochum, Germany
sasshm@aol.com

The mosaic theory of complexity

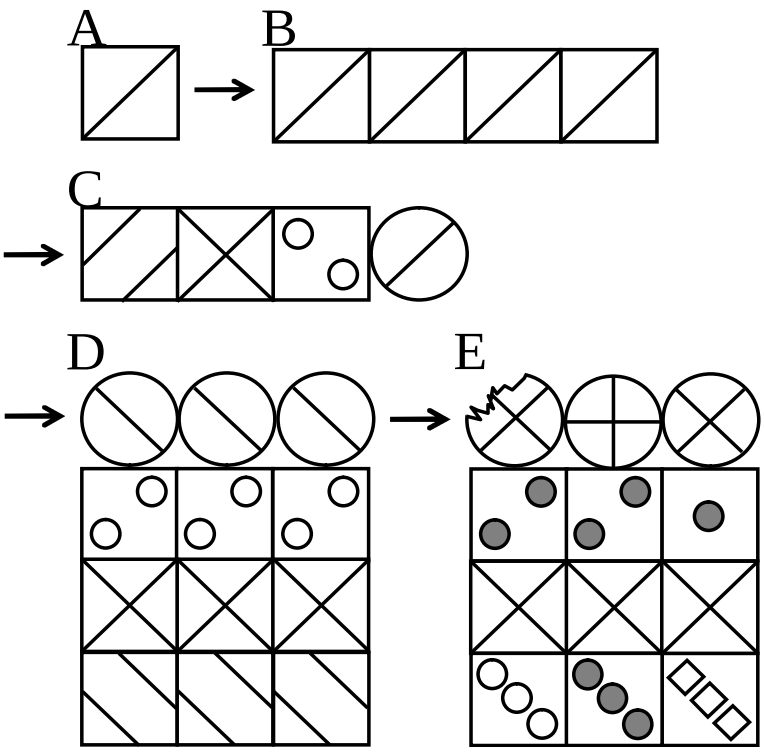
– A working hypothesis for the complexity of living organisms

Georges CHAPOUTHIER (Paris/France)

1. Introduction

The basic tenet of my stance is that complexity in living beings, and no doubt in other fields, arises from the repeated application of two main basic principles: *juxtaposition* of similar elements and the subsequent *integration* of these elements into a higher structure where the elements acquire specific functions and become parts of the new and more complex whole[202]. The new structure produced through *juxtaposition* and *integration*, can be described as a mosaic structure.

Figure 1



[202] This article is based on the guest lecture of the author which was giveb at the University of Vienna in May 2015. Chapouthier G. Mosaic structures, a working hypothesis for the complexity of living organisms. *E-Logos (Electronic Journal for Philosophy)* 2009; 17: http://nb.vse.cz/kfil/elogos/biocosmology/chapouthier09.pdf.

be described as a mosaic structure. In art, a mosaic is a complete representation made of small component elements – *tesserae* – all of which retain their intrinsic properties, e.g. colour, shape and brilliance. Other complex mosaic forms are made of parts that keep some functional autonomy while operating within the whole.

Figure 1 is a diagram illustrating these processes[203]. It is possible to *juxtapose* elements such as (A) to obtain a juxtaposed sum total of (B). When (B) elements are *integrated*, the structure (C) is produced and is the sum total of the elements that were (A), yet each element may be modified and may have a specific function. (C) is thus a mosaic of the original (A) elements, subsequently modified, but with its component parts still having a certain degree of autonomy. It is possible to go on repeatedly applying the same principles: the juxtaposition of (C) will produce (D) then integration will produce (E), it being a mosaic of mosaics.

2. Genetic and anatomical examples

Many examples of the mosaic model can be found in the field of biology, in relation to living beings. The following cases will be presented: genes, the anatomy of living organisms, the anatomy of the brain, mind processes and repercussions, and pathological processes.

Certain genes have sequences called *introns* which, compared to active genes (*exons*), do not have any practical effect on the life of the organism. Introns do not produce any protein involved in cell metabolism; they remain silent. Observations have shown that introns occasionally duplicate, producing collections of identical introns (i.e. juxtaposition). With time, some of the juxtaposed introns change through mutation processes; when the cluster of juxtaposed introns becomes a cluster of mutated introns, they may integrate their functions to produce a new organic component. The cluster then becomes a functioning exon with an effect on the organism. If the change is

[203] All figures in the present article are adapted from G. Chapouthier, *L'homme, ce singe en mosaïque*, Odile Jacob Publisher, Paris, 2001

beneficial, it will survive through Darwinian selection and become part of the new organism, or perhaps even a new species. If, however, it is not beneficial, the bearer of the new cluster may die without producing any descendants and the change will therefore disappear. According to authors such as Ohno[204], the occurrence of these processes over long periods of time may offer an explanation of evolutionary progress. There is clearly a sequence of juxtaposition and integration processes.

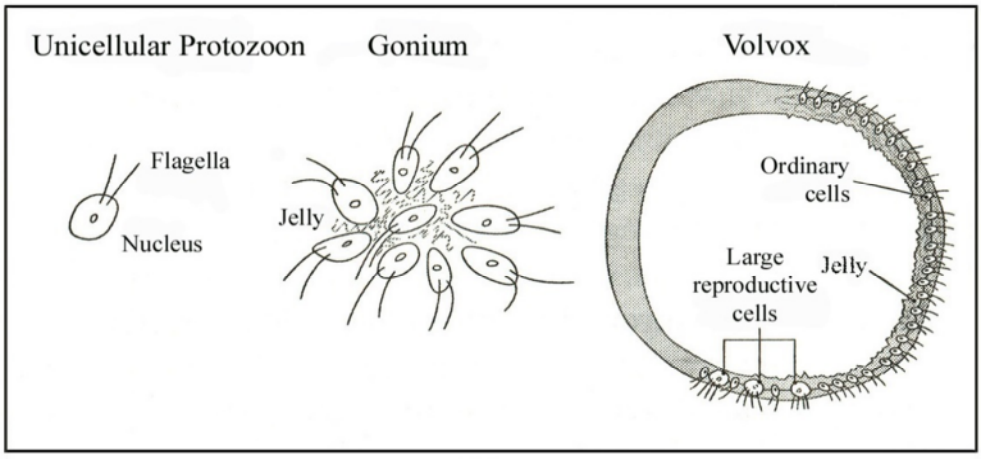


Figure 2

Observation of the anatomy of living beings provides examples of mosaic processes. Let us start with unicellular organisms. As seen in figure 2, there can be a single cell with a few locomotor flagella (at this level, plant and animal organisms have a similar organisational structure, and there is no need to distinguish between them). In other cases, e.g. *Gonium*, the cells can come together (be juxtaposed) in a jelly where all cells have exactly the same function. In more complex organisms, such as Volvox, some cells are "ordinary" while others acquire special functions, e.g. reproduction. This integrated organisation may be described as a first attempt on the path to multicellular organisms. Multicellular animals include organisms with two cell layers, such as polyps and jellyfish, as well as animals with three layers of cells. Most of the animals we know in the world around us belong to the three-layer group.

[204] Ohno S. *Evolution by gene duplication*. Springer Verlag: Munich, 1970.

Juxtaposition, as seen in figure 3, is common among two-layer organisms. The top figure is a cross-section showing the two layers (one external and one internal) of a single polyp. In coral reefs, thousands of similar, juxtaposed polyps can be seen, as illustrated in the bottom figure; they produce a mineral skeleton to protect themselves.

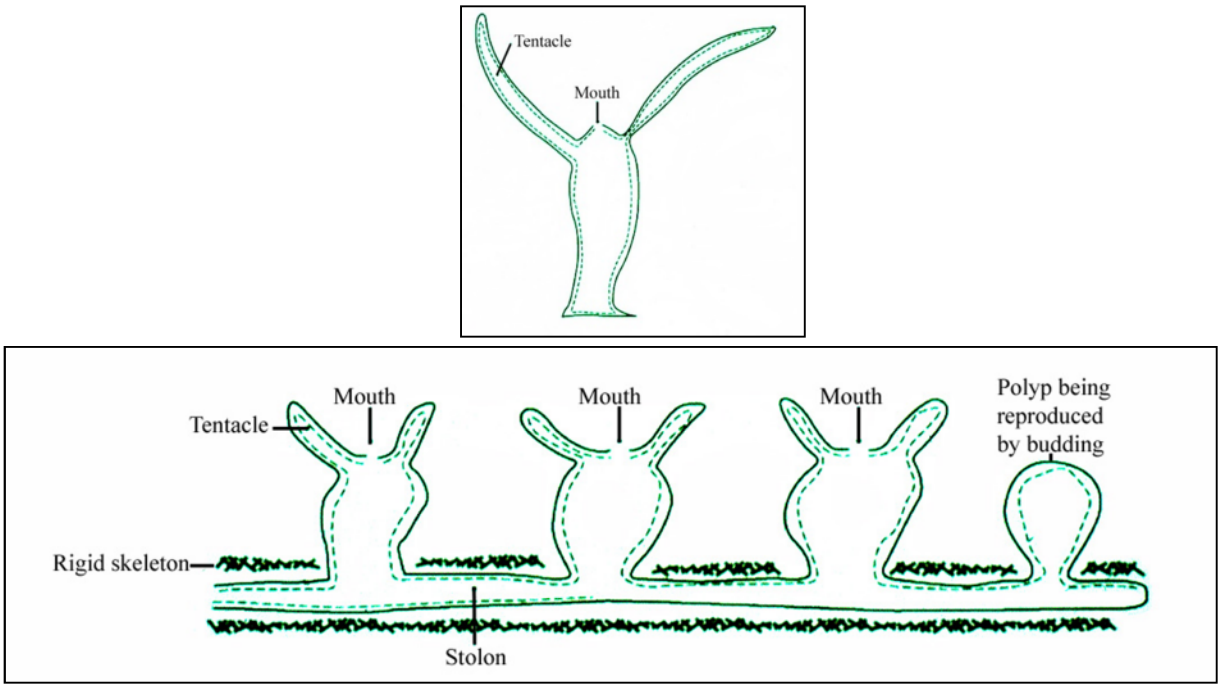


Figure 3

Observations have shown colonies of polyps known as siphonophores floating on the surface of the oceans. But siphonophores are integrated polyps, each one being different, with digestive, defensive and reproductive polyps, as well as polyps serving as floaters for the colony.

Moving to three-layer animals, the common garden earthworm can be seen as a juxtaposed structure with its segments (or metameres) which are similar. Further integration of a basic structure produces more “complete” animals such as the bee, the

octopus or the chimpanzee (or even the human being). All are integrated three-layer animals. Can these three-layer animals be explained according to the principles of juxtaposition and integration? On the physical, i.e. anatomical side, juxtaposition clearly exists, for example with Siamese twins, i.e. two identical juxtaposed and equivalent organisms. But since they have to move, the anatomical evolution has not gone very far in integration in this case.. The principles, juxtaposition and integration can also be observed in social constructions.

Certain animals, birds and insects, gather together to rest, forming groups where each individual has the same role. In such juxtaposed gatherings, all the animals are equal or equivalent. If these groups are then integrated to obtain situations where individuals have different roles or functions within the group, the result is a society of animals, e.g. a bee hive or a troop of primates, including human societies. The degree of autonomy of an individual human in a given society as a component part (or tessera) in relation to society as a whole is what we call freedom.

3. Anatomy of organs

Mosaic organization can be observed in physical organs. For the purpose of the present argument, we shall focus on one essential organ, the encephalon, or brain.

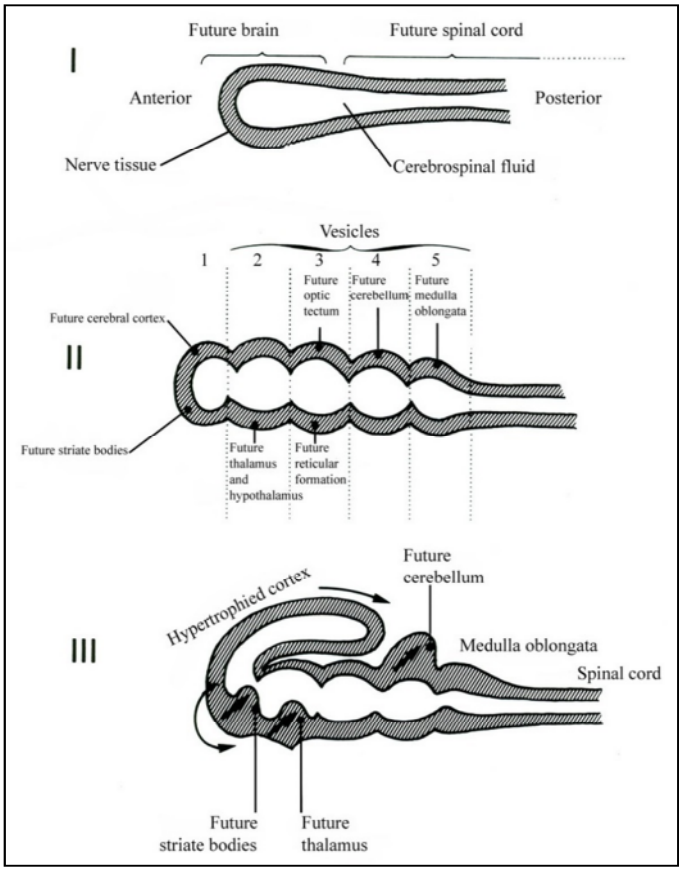


Figure 4

Figure 4 is a cross-section diagram showing the development of the embryonic encephalon: it starts as a single vesicle (I), becomes five juxtaposed vesicles (II), and integrates, developing into something more complex that will be the adult brain (III). The final stage of integration includes substantial growth expanding the top of the first vesicle, forming the cortex which will eventually cover most of the other areas, except the cerebellum, and will divide into two hemispheres, the left and the right.

The development evolution of the encephalon is a clear illustration of stages of juxtaposition and integration. The mosaic model can also be seen in the construction of the cortex. The surface of the cerebral cortex of both hemispheres is a mosaic of different areas that have been physically juxtaposed and, for functional purposes, partially integrated, with areas of visual, auditory and sensory perception, motor control, oral language perception and expression, and reading and writing skills. All the areas have partial autonomy for their specific function(s) and are partially integrated for the harmonious functioning of the whole cortex. This mosaic of cortical

areas is probably one of the most striking examples of mosaic structures observed in living beings. Looking at the two hemispheres, their functional relationship could be described as a mosaic with only two components, only two tesserae. In primitive vertebrates, such as fish, the two hemispheres have parallel, juxtaposed roles, the left hemisphere controlling the right side of the body and the right hemisphere controlling the left. Adding to this simple juxtaposition, higher vertebrates such as birds and mammals have an integration process that gives specific roles to each hemisphere; e.g. birdsong is often lateralized in the left hemisphere, and this is also the case for human language (for right-handed persons), while the right hemisphere gives an overall perception of global shapes. When combined, the two hemispheres form a mosaic comprised of two integrated structures.

The three examples (the developing encephalon, areas of the cerebral cortex and the relationship between the two hemispheres) are useful to highlight the pertinence of the mosaic model in understanding the anatomy of the brain.

4. The Mind and repercussions

The present article will not embark on the controversy of the brain Versus the mind, or endeavour to establish any relationship between the brain and the mind, or advocate a materialistic or spiritualistic stance. We may note that the mosaic model, as seen to be valid for the brain, can also be presented as a model for different aspects of mental processes.

The first area is consciousness. It is often believed that human consciousness is a unitary process, but this is not the case. The findings of a number of experiments suggest that human consciousness is an integrated function of several components[205]. The most striking example is split-brain subjects, i.e. human patients who have had accidents rupturing the *corpus callosum*, a group of neuronal fibres that communicate between the two hemispheres. Observations show that split-brain patients have two

[205] Delacour J. *Biologie de la conscience*. Presses Universitaires de France: Paris, 1994.

different decision-making centres, which means two different consciousnesses, one in each hemisphere. The two consciousnesses can take contradictory decisions (e.g. picking up unmatched garments, one in the left hand and one in the right). Without the *corpus callosum* it is impossible to correct or resolve such conflicts.

Memory is not a unitary process either, but rather a patchwork, a mosaic of different skills, acquired in the course of animal-human evolution, juxtaposed in our memory system and slightly integrated[206]. Memory covers very basic skills, e.g. habituation and alternation behaviour, and more complex memory skills, e.g. conditioning and higher or sophisticated abilities such as spatial memory and cognitive memory. Only animals with a highly developed central nervous system, e.g. vertebrates and cephalopod molluscs, possess all these skills, in other words, they all the tesserae of the memory mosaic.

Language is another mosaic structure[207]. When I pronounce a sentence, I juxtapose semantic units (words) as a linear sequence, the final meaning only becoming apparent at the end of the sentence when all the semantic units have been integrated, sometimes with complete changes in the integration. If I say: "This delicious chicken… is covered with feathers", I start with the image of poultry to eat and end up integrating the idea of live bird. Literature and humour use this faculty extensively. In general it may be said that literary works are mosaics of integrated elements; for example, a novel uses different combinations and permutations of plot options in a gradual lead-up to the conclusion providing the reader with the solution. The Japanese haiku is an interesting poetry form to analyse, each haiku having three parts of 5-7-5 feet respectively, with the last of the three parts expressing a strong poetic symbol to give the full meaning to the entire poem. Yet the first two parts stand as partial images contributing to the final symbolic integration. "If a 5-7-5 verse has to do with a

[206] Chapouthier G. *Biologie de la mémoire*. Odile Jacob: Paris, 2006.

[207] Robert S, Chapouthier G. The mosaic of language. In : *Les origines du langage et des langues*. Fracchiolla B, (editor). Paris: L'Harmattan; 2013. pp. 211-223.

successful symbol, it will be defined as haiku" as noted by Hashi[208]. The same mosaic construction can be seen in drawing. A child learns to draw by juxtaposing strokes or curves, later combining them to depict the shape of a human face or the sun.

Moving to examples with music and technological objects, I shall cite articles that quote my mosaic model. The music specialist Marshall Heiser (Queensland Conservatorium of Music, Griffith University, Australia) analysed Brian Wilson's aborted Beach Boy's album "SMiLE"[209]. With reference to my mosaic model, Heiser analysed the tapes and concluded that there was clearly a mosaic structure to Brian Wilson's work. On technical objects, the robotics specialist, Frederic Kaplan (Lausanne, Switzerland), stated that[210] technical development also proceeds by juxtaposition and integration. "A new set is first created by combining elementary technical objects" and the system is poorly integrated. After a certain time for technical development, an object, e.g. a printer, motor or computer, is more highly integrated than when it was first invented.

For social structures, I shall give two examples. The Russian sociologist Piotr Sorokin[211] has called for a new sociology capable of reconciling mutually exclusive and contradictory theories, an integral sociology to come, capable of integrating current sociological stances as its component parts. The Japanese philosopher Naoshi Yamawaki[212] ([10]), however, sought to define social rules that could apply to trans-national public ethics, and found that such rules could be determined by either global

[208] Hashi H. The Influence of Zen-Buddhism on Haiku Poetry. In : *Int. Haiku Symposium.* Hashi H, (editor). Vienna, Austria; 2014. pp. 1-11, p 2.

[209] Heiser M. SMiLE: Brian Wilson' s Musical Mosaic. *Journal on the Art of Record Production* (online) 2012; p 7.

[210] Chapouthier G, Kaplan F. L'homme, l'animal et la machine, perpétuelles redéfinitions. CNRS Editions: Paris, 2011.

[211] Sorokin PA. Sociology of yesterday, today and tomorrow. *American sociological Review* 1965; 30(6): pp 833-843.

or local considerations, thus coining the term ”glocal” to cover the relationship between global (whole) aspects and local (component) aspects of the social rules.

Ethical stances will be seen in the light of research by two young French ethicists: Vanessa Nurock [213] ([11]) and Corine Pelluchon [214] ([12]). Nurock reported that empathy is a combination of three juxtaposed processes: agentive empathy (putting oneself in the position of another being), emotional empathy (imagining the feelings of another being) and situational empathy (understanding the cognitive situation of another being's life and behaviour, also known as the Theory of Mind). Integration of the first two processes may produce a basic concept of ethics, while full integration of all three processes could produce full-scale human ethics. Certain human disorders are caused by some processes being absent; for example, autism may involve situational empathy deficits, and for certain psychopathic disorders it could be agentive and/or emotional empathy deficits. Corine Pelluchon endeavoured to integrate three separate and juxtaposed moral stances – human ethics, animal ethics and environmental ethics – into an integrated stance which she named “vulnerability ethics”, developing mosaic integration of conventionally juxtaposed moral duties.

Pathologic abilities can also be interpreted as evidence of mosaic structures(); for example, epilepsy may be triggered by a combination or juxtaposition of agents such as chemical compounds or scar tissue, involving juxtaposed, and sometimes partially integrated, genetic, neuronal and neurochemical processes, ultimately producing different forms of epilepsy, with independent and juxtaposed elements, albeit with sometimes limited integration

5. Philosophical stances

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[212] Yamawaki N. Pour une philosophie publique et transnationale. *Diogene* 2009; 227:182-202.

[213] Nurock V. *Sommes-nous naturellement moraux?* Presses Universitaires de France: Paris, 2011.

[214] Pelluchon. C. *Eléments pour une éthique de la vulnérabilité - Les hommes, les animaux, la nature*. Cerf: Paris, 2011.

5.1. The epistemic stance

The initial mosaic model as a biological approach is basically non-separation (and modification) of structures (e.g. cells, polyps, worm segments and animals) that could be separated and might have given independent structures. The mosaic model can be seen in the metaphor of the Siamese twins, with asexual reproduction, producing two or more genetically and morphologically identical structures simply by separation, in contrast with sexual reproduction, involving complex genetic reorganisation through the production of sexual cells and eggs. The process of Darwinian evolution is based on sexual reproduction, allowing selection of sexually modified individuals. Mosaic complexity thus represents an epistemic rehabilitation of the importance of asexual reproduction which is fundamental to the living world, yet has not been given sufficient attention.

5. 2. Ethical stance

Corine Pelluchon's thesis (mentioned above) has a finding which I can adopt as the key ethical conclusion for my mosaic model. While ethics (Aristotelian, Kantian or utilitarian) is still a major concern for human beings, the scope of ethics cannot be limited solely to humans. Ethics stand as a human development, but should cover more than human subjects. Recent discussions[215] have highlighted the issue of the treatment of sentient animals – animal ethics – and also the issue of the environment (environmental ethics). There is a clear need for integrative ethics accommodating these three subjects in juxtaposition (humans, animals and the environment) and this too would fit the mosaic model.

5. 3. Mosaics and the Neo-Aristotelian/Biocosmological stance

As we have seen, mosaic structures can apply to a wide range of fields, including biology, sociology and philosophy. One interesting approach is the Neo-

[215] Chapouthier G, Animal Rights, *Encyclopedia of Global Bioethics* (online)

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Aristotelian/Biocosmological stance developed in Russia by Konstantin Khroutski[216], a stance which I share. The basic argument is that the Aristotelian view of the cosmos is biological not physical; and in the context of biology, the rules of the macrocosm (the cosmos) mimic the rules of the microcosm (as observed on earth). In modern terms, this obviously does not mean that the cosmos is a great ape, but simply that the general complexity of the cosmos should reflect the complexity of what is observed on earth, i.e. biological complexity. To date, no direct proof has been established to show that the mosaic model can apply to stellar objects, offering evidence for a direct isomorphism between macrocosmic and microcosmic events in our model. I have asked specialists in astrophysics to investigate the possibility, and they are currently studying this. Given the validity of the mosaic model in so many different fields of the terrestrial microcosm, this appears to be a reasonable hypothesis.

The question could also be addressed by seeing our mosaic model in relation to the General System Theory (Ludwig von Bertalanffy, 1968)[217] which is based on the assumption that common models can be found in different fields of knowledge. Our mosaic model would clearly be one of these general models, describing the fundamental construction of complexity.

5. 4. Mosaics and dialectics

Mosaics, as defined in the present article, may appear to have a major handicap as the impression convey is that the structural entities are static at a given point in time static in their evolutionary development, and without explaining how the evolution occurs. Evolution, according to Darwinian theory, is part of the broader evolution of the universe, as described in ancient times by Heraclitus. This evolution can be seen in the realm of thought and logic (Hegel) and in the realm of material things (Engels): the dialectics of nature can be seen as a reflection of the dialectics of the mind. The

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[216] Khroutski K. Biocosmology - Rehabilitating Aristotle' s Realistic Organicism and Recommencing Russian Universal Cosmism: Response to Arthur Saniotis. *Eubios Journal of Asian and International Bioethics*, 2008; 18: pp 98-105.

[217] Von Bertalanffy L. *General System theory: Foundations, Development, Applications. George Braziller, revised edition: New York, 1976.*

basis of the dialectical process is opposition between the two processes, one logical, one natural; it is thesis and antithesis, achieving resolution (overcoming opposition) in a higher result (combined in synthesis). As argued in another publication[218] this may be compared to the triune process of the Neo-Aristotelian/Biocosmological approach developed by Konstantin Khroutski.

What is interesting here is that the dialectical approach which bring an evolutionary dimension to static mosaics is based on two opposite processes meeting at the same level (thus juxtaposed) which finally result in a synthesis (having overcome) which may be interpreted as a form of integration of the two initially opposite processes. When defining movement – evolution for the mosaics – we therefore observe that the movement is itself driven by a mosaic process. In other words the dialectical movement of the world, which may express a time-related or evolutionary aspect of the mosaic model, has a mosaic structure itself.

6. Conclusion

Biological complexity arises in mosaic formation through repeated application of the two basic principles of juxtaposition of similar units and integration of the modified units into higher structures which, as is the case for mosaic art, will leave a degree of autonomy to the individual component parts. The processes, clearly observed in genetic structures and the anatomy of living beings, can be extended to various fields of human knowledge such as psychology, literature, drawing, music, sociology, robotics and philosophy. The philosophical interpretations and ramifications include the epistemic rehabilitation of asexual reproduction, the need for a more broadly integrated moral and ethical approach to animals and the environment, the links between our mosaic thesis and the Neo-Aristotelian/Biocosmological approach as well as the General System Theory, and the use of the philosophical concept of dialectics to set mosaic structures on an evolutionary path, the dialectical process itself also being a potentially mosaic process.

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[218] Chapouthier G. Mosaic structures in living beings in the light of several modern stances. *Biocosmology- Neo-Aristotelism* (online), http://en.biocosmology.ru/electronic-journal-biocosmology---neo-aristotelism 2012; 2(1-2): pp 6-14.

All figures in the present article are adapted from G. Chapouthier, L'homme, ce singe en mosaïque, Odile Jacob Publisher, Paris, 2001

Georges Chapouthier

(Professor emeritus, Dr., Centre national de la recherche scientifique, Paris)
georges.chapouthier@upmc.fr

Aristotelian Organicism, Yin Yang Theory and our Representation of Reality

Marianna BENETATOU (Athens/Greece)

Introduction

The paper discusses Aristotelian organicism and the yin yang theory from the view-point of their overall adequacy to provide a comprehensive conceptual context to aspects, at least, of our contemporary representation of reality. The context may refer to specific fields of scientific research, our everyday mode of thinking and acting, or both. As the survey goes on, it is increasingly made clear that we deal with two different types of conceptuality. The yin yang bipolarity may be defined as a pattern of change with a practically unlimited field of applicability. The Aristotelian organicism outlines a model of change which stirs our rational faculties to search for a purpose amidst the accumulated data. In the first case the pattern may be creatively used within a vast variety of contexts. In the latter, the theory creates a conceptual context based on the four causes as first principles.

All-Pervasiveness of the Yin Yang Bipolarity

I start from the observation that the yin yang bipolarity, in its endless declinations, currently seems to gain in popularity at the most heterogeneous fields, from medical science to interior decoration. Notwithstanding the fact that European thought most frequently favors a binary conceptual pattern, the reason for such a "rush" may well be due to the practical aspect of the Chinese bipolarity.

First, the yin yang theory describes natural processes by spontaneous alternance of pairs of opposites. It advances a model of becoming ruled by automation, characteristic of nature (*ziran*, 自然, lit. *self-so*). Laozi and subsequent philosophers, both Daoists and (Neo-) Confucians, underline the impersonal character of the activity of opposites. In the *Laozi*, we read that "*Heaven and Earth* [the archetypal pair of opposites] *are not humane* [*bu ren,*不仁]*; They consider the myriad things to be straw dogs*" (*Laozi, 5*). The characteristic of the Confucian virtue of humaneness is caring,

loving, taking care of, fostering and preserving. By omitting such functions from the workings of the paradigmatic pair of opposites, Laozi rejects both the idea of purpose, even unconscious instinctive, and that of a conscious agent as creator or regulator of natural processes. The incessant alternance of successive pairs of opposites suffices to account for reality as becoming. Wang Bi comments the passage in these terms: "*Heaven and Earth engage what is natural to things. They accord with 'non-action' and 'non-creation' and the myriad things order themselves of their own*" (cited in Chen, 1981, 69). The contrast between human purposefulness and natural automation is explicitly illustrated in another significant passage: "*Thirty spokes converge at one nave, but only when there is non-being does the function of the carriage exist; We mould clay in order to fashion a vessel, but only when there is non-being does the function of the vessel exist*" (*Ibid., 11*). The commentarial tradition explains that being designates utility and non-being designates function (Chen, 1981, 90). Without contesting this interpretive line, I point to the tension introduced by Laozi between, on the one hand, human intentionality and production, and, on the other, natural creation coming from spontaneity, non-action, non-intention. In the Daoist context, a realistic and pedagogic account of natural processes stirs clear of any idea of nature as planning, going on by trial and error and ultimately of evolution or progressive change.

Neo-Confucianism, following the path of classic Confucianism, conceives nature as self-changing and self-organizing. The metaphysical principle of *li* (*理*) might provide a platform for a reflection on natural finality, either on the individual level of natural beings or on that of nature as a whole. Far from that, Neo-Confucians have focused on the impersonal quasi automatic arranging or organizing capacity of *li*. Although it is immaterial and precedes forms, i.e. physical things, it is immanent in their manifestation as individual beings. A. C. Graham explains it thus: "[Li] *is itself conceived as a vast three-dimensional structure which looks different from different angles. In laying down the lines along which everything moves, it appears as the Way (Dao); in that the lines are independent of my own personal desires, it imposes itself on me as Heaven (tian); as a pattern which from my own viewpoint spreads out from the sub-pattern of my own profoundest reactions, it appears to me as my own basic Nature (xing)*" (in Angle, 2009, 35). S. Angle sums up the situation as follows: "*Li is indeed a kind of pattern or network of interdependencies, a pattern that is constituted partly by my own 'profoundest reactions'*" (*Ibid.*). The component of 'profoundest reactions' introduces subjectivity in the heart of the structuring process of reality. It is only one aspect of *li*; the other one is the objective conditions of the environment, of

the external context to which I respond. An intelligible world cannot leave aside important aspects of subjectivity, such as emotions. When we speak of emotions we speak of aspirations and pursuits. Therefore, Neo-Confucian analysis does not discard personal aspirations and intentionality as co-factors of the structuring process of reality. It is equally true that a certain degree of suspicion surrounds human affects in the sense that more often than not they express egotistic tendencies. Instead of establishing networks of cosmic dimensions, they isolate to monad-like closed milieu.

Such instances, easily multiplied, point to a conception of nature and naturalness that rejects any idea of purposeful direction. Nature and natural beings are not goal-oriented; they just make the most of the present circumstances and when everything works well, i.e. to the mutual benefit of everybody involved, then harmony is achieved. Even personal emotions and intentions are not the driving forces of humanity. No-action in Daoism or humaneness in neo-Confucianism is beyond the sphere of personal or collective drives. They express a more fundamental level of depersonalization, expressed as return to the original nature and pristine naturalness.

In these terms, the yin yang bipolar model of change appears as automated and purposeless. There is no teleology; just the alternance of opposites. It is equally significant that the yin yang theory enjoys a tremendous momentum in contemporary Western literature. It well coincides with the current denial of any idea of teleology in the natural processes. This is a long persistent reaction to Christian dogma of divine providence; the denial of providence has also banned any idea of searching for purpose or goal in the natural world. Science describes and explains processes and so does, in its own idiomatic manner, the yin yang pattern. In fact, the yin yang pattern, ready to put forward opposite extremes, may facilitate the propagation and understanding of some aspects of modern science which seem too abstract or abstruse to the average reader. The super symmetry cosmological theory, for instance, has attracted much attention by Daoist scholars (see, for instance, Zhang, 2012, 264-269). Matter and anti-matter may be rendered in terms of being and non-being, the foundational pair of opposites preceding Heaven and Earth within the conceptual frame of the *Laozi*. Such combinations of Western scientific theories with the yin yang tangible and easily perceived pattern of change are made possible by the shared idea that it suffices to give an account of natural processes in order to explain how nature works.

Aristotle's criticism of pairs of opposites as principles of change

With Aristotle we come to an entirely different conception of nature. Here teleology plays the first role and organizes beings-not processes or events- as finalizing or goal-oriented individuals. The vocabulary also expresses a person-oriented conception: Beings are accounted for as interactive living entities inasmuch as they pursue natural goals. They thus are naturally endowed with a purpose in contrast to the apersonal previous view which explains functions and events. Aristotle perceives an innate inner perception of every living being to pursue excellence. Living beings have focus whilst living delineates such focus to so many pursuits. Pursuits vary, change, come back and obsess. There are infinite declinations to the theme of aspirations and goals and all of them define and structure every single individual life.

Aristotle is familiar with the pattern of change by means of pairs of opposites. His Greek predecessors had thoroughly delved in such theories. He singles out Parmenides on the one hand and the so-called –by him- Naturalists, as Democritus, on the other. In *Physics I*, he surveys their views in order to advance his own theory on the principles of natural change. In main lines, he does not reject the explanation of change by pairs of opposites. Indeed, change is the transition from one extreme to the other or to the intermediate; in any case, the extremes or the intermediate must be clearly determined. Accepting the general pattern, does not mean that Aristotle accepts his predecessors' various theories. He finds them simplistic and erroneous: Bad reasoning based on bad premises. So, let's survey briefly his main points of criticism. First he remarks that all of them take as principles the opposites. This is all too understandable inasmuch as principles cannot come one from the other or from other things, whilst everything must come from the principles. This concerns the first pair of opposites which come neither from other things, nor from each other (*Physics, I, 188a 27-32*). As a general rule, Aristotle concludes that things born and things decayed come from opposites or end in opposites or intermediates. The intermediates do not create any difficulty as they come from the opposites, as, for example, colors come from white and black (*188b 25-28*). "*Therefore, all beings becoming naturally, are opposites or come from opposites*" (*188b 28-30*). Aristotle finds out that his predecessors may well agree on the general idea of opposites as principles, they nevertheless diverge as to the content of opposites. In his view, this is a futile discussion, as the standard of choosing one pair of opposites rather than another is entirely arbitrary, based on subjective criteria (*188b 30-189a 11*).

The discussion takes a fresh turn with a seemingly incongruous question: Are the opposite principles two, three or more (*189a 12-13*)? They definitely are neither one nor -as advanced by Anaxagoras-infinite (*189a 12-23*). They are finite and at this point Empedocles was right (*Ibid.*). Here comes the Aristotelian twist, which changes everything. "*But if they* [the opposites as principles] *are finite in number, one reasonably may not conceive them as two; for one may wonder how density may naturally act somehow upon thinness or thinness upon density. Likewise for all other opposition; for friendship does not mix up with hatred, neither creates something from it, nor does hatred from friendship; but both* [act] *in another third* [term]" (*189a 24-30*). Naturally, the third term is none other than the subject-substance-matter, whilst the opposites are the predicates-form. A further argument makes clear that whatever becomes is composed of subject (matter) and form (*190a 15-190b 22-23*). Now, the introduction of the subject transforms the idea of opposites. Opposites do not need to be two in order to bring about change: "*because it suffices one of the opposites, with its absence or presence, to bring about change*" (*191a 7-9*). At this point, Aristotle advances that matter is one of the principles and form is another. Matter, as subject cannot have an opposite and the opposite of form is deficiency (*191a 13-15*).

Aristotle takes great pains in order to adapt the concept of change to *hylomorphism*. Pairs of opposites as principles of change become obsolete. They explain all right, but-as we shall soon see- they are inadequate to give precise information on the modality of change. They merely describe the general framework wherein change takes place. They don't explain what changes and for what reason. According to Aristotelian substantialism, what changes is a subject; it changes either by itself or moved by some external force (*192b 12-14*). The line of arguments points to a major innovation in the field of natural movement, namely purpose. Form is primarily the organizational principle of life. Beings exist, but they don't just drift about, left in a thoughtless stream of growth and development. They have a purpose, a goal. Aristotle makes the distinction between the end and the goal, for "*not every end is a goal, but only the best*" (*194a 37-38*). Imagination and instinct in animals, reason and intention in humans, even the drive to nourishment and growth in plants, go far beyond mere function. All, in their personal manner, pursue what is best for them; some do it quasi-instinctively, others need deliberation, decision and choice. The what for (*to hou heneka*) is the driving force of natural beings and the great contribution of Aristotle on what a living being individually and collectively really means.

The distance taken from pairs of opposites as explanatory principles of nature and natural beings leads to another important consequence: It conditions the space of initiative and goal-oriented action –purpose again- where beings evolve according to natural tendencies but with more or less freedom. The main objection of Aristotle to the pairs of opposites seems to focus on the issue of necessity and randomness versus freedom and self determination. Let's follow the argument.

According to the representatives of pairs of opposites, natural phenomena are not driven by a *telos* but by necessity (*anagkê*). For instance, the warm is so by nature and

likewise the cold, etc. Such things happen by necessity (*198b 13-18*). Such explanations give an impersonal, "scientific" account of phenomena, seemingly unassailable. Nature may well act not in view of a certain purpose or for the best, but in the manner of Zeus who rains by necessity and not for maximizing harvest. For when vapors ascend they cool down and the cold turning to water returns to earth. The maximization of harvest is just a consequence (*198b 20-28*). Teeth likewise grow diversely and accidentally their different shapes respond to different functions (*198b 29-34*). "*And naturally, the beings to which all happened as if there were in them a teleological destination survived, for they were found adequate; the others, which were not made in this way, disappeared and disappear, as Empedocles says about cattle with human face*" (*198b 35-40*). Aristotle raises two objections. First, natural phenomena are always or most often as they are. Random and spontaneous phenomena appear exceptionally and cannot claim to constancy and permanence. Much rain in winter and heat in summer cannot be accidental phenomena or simple coincidence. Therefore, they exist in view of some purpose. However, such things exist by nature, as the proponents of such ideas advance. Therefore, purpose is within change and within natural beings (*198b 42-199a 7*). The second argument is based on the idea of time sequence, or prior and posterior. Nature works as we do; rather we work as nature does, but it is easier to start from the human level in order to understand the workings of nature. We make things for a certain purpose and likewise natural creation serves a certain purpose, "*for the prior and the posterior entertain the same relation to each other in both artificial and natural things*" (*199a 19-20*). This is particularly evident in the flora and fauna. Leafs are made for protecting fruits, swallows make their nest and spiders their web and all such phenomena prove that teleological causality exists within natural beings and changes (*199a 27-32*). Nature being the compound of matter and form, and form being the goal, for all else is made for this goal, it (form) is the teleological cause (*199a 33-35*).

Aristotle further mentions that the issue may concurrently be studied according to the bipolarity *dynamis* and *entelecheia*. Matter is no being by accident, whereas deprivation is no being in itself. Deprivation as no being cannot be essence, whereas matter being closer to being is in a way essence, but deprivation is absolutely not essence (*192a 4-8*). In sum, Aristotle points that previous philosophers who explained natural phenomena and change by pairs of opposites confused ontological categories, such as no being by accident or no being in itself, as on a parity with each other and with being.

And our Representation of Reality

Modern scientific theories wisely abstain from pointing to any purpose in natural phenomena. Having recourse to purpose in order to explain natural phenomena would be taxed as infantile fixation. As I have stressed earlier, the yin yang theory well accords with an impersonal order of things governed –as Aristotle has pointed out- by necessity.

In my view, goal oriented scientific explanations abound without being expressly taxed as such. The most prominent case is without doubt the theory of evolution by natural selection. Darwin defends his theory as an entirely hazardous series of occurrences which all concur in the most inexplicable and marvelous way to promote the survival and continuation of the fittest by the transmission of their characteristics to their descendants. Darwin follows a method of analogy reminiscent of the one familiar to Aristotle. He observes the way humans proceed to breed domestic races in order-as he prudently puts it- to perpetuate their favorite stock and then extrapolates to the workings of nature. As humans select the best animals to breed, natural selection permeates to the fittest individuals to transmit their characteristics to their descendants. Nature works in the manner of humans, therefore by observing the way humans work, we may understand the way nature works.

More than two thousand years before Darwin, Aristotle had firmly established the analogy in his discourse on the four cause theory. The human paradigm concerned a sculptor and his sculpture. The material corresponds to the material cause, the idea of what the sculpture will look like corresponds to formal cause, the agent/sculptor corresponds to efficient cause and the sculpture as a finished work of art corresponds to the final cause. Aristotle explained thus that human activity is always goal-oriented even if the goal is not always as obvious as in the case of a sculpture. Therefore,

concludes the argument, nature works towards a direction. Natural beings have goals and aspirations and are goals in their own right. Darwin took up the same analogy human activity-natural process but denied to the latter part of the comparison the existence of purpose. He firmly denied any idea of evolutionary direction. However, it is hard to by pass the ascending direction from simple to complex organisms culminating –one is tempted to conclude naturally- to us, lucky humans.

Recent research recognizes the importance of teleology in Aristotle's scientific writings, such as *De Partibus Animalium, etc.* There Aristotle applies the principles of his philosophy in a manner adequate to the subject-matter. He gives an account of organisms and their function. More specifically, he delves mostly in the workings of the nourishing soul –to be explained shortly- which corresponds partly to the biological level. This properly functional teleology constitutes scientists' favorite field of glossing over.[219] The so-called "scientific writings" reflect partially the teleological cause in its full philosophical development. In order to understand what Aristotle implies by teleology, we need to consult his philosophical writings. Due to time constraints, I shall focus on one major text from *De Anima*. In the discussion of the nourishing soul, the most basic and common to all living beings, Aristotle explains its purpose as follows: "*Her* [the nourishing soul's] *work is to give birth and nourish, for the most natural work of animals/living beings, those which are perfect and not imperfect, nor spontaneously born, is to create another being similar to them, animal to create animal and plant to create plant, in order to participate as much as they can in the eternal and divine. For all desire this and do for its sake whatever they do according to nature. The goal* [lit. the for its sake] *is of two kinds, the one is the final cause and the other is the whereby the end is achieved. As living beings cannot participate in the eternal and divine by their permanent individual existence, for none of the perishable may remain the same, inalterable and numerically one, each participates in the divine in the way it can, other more other less. It does not remain the same but similar to it, not numerically one, but one in species*" (*De Anima, II, 415a28-415b8*).

The passage is not a marginal note, but a foundational text giving a precise definition of what the teleological cause means in respect to living beings. Its scope far exceeds the functional accounts of the zoological writings by determining a metaphysical

[219] For an updated account of Aristotelian science, see the highly readable and encyclopedic in scope Armand Marie Leroi. 2014. *The Lagoon. How Aristotle invented Science*. Bloomsbury. London.

perspective to all forms of life with the exception of imperfect or self-born beings. In seeking to participate in divine eternity, beings seek to mate and reproduce another being similar to them but quite distinct. What persists and participates in eternity are not individual beings but species. In other words, individual beings are perishable, but the various species are imperishable. The transmission of form from parents/father to children receives an almost sacred significance, inasmuch as it carries the print which permeates to parents to partake of immortality.

Aristotle equally makes provision for the final cause within the limits of an individual life. Individuals are the final cause of their creation and pursue ends and aspirations within their finite life span. Happiness is, for instance, an individual goal, the final cause of a rational human being and therefore its pursuit mobilizes all the resources of an individual. It may well be that these individual goals are species determined with personal and temperamental variations, as we may observe in the properly human goal of happiness and its endless modalities among its aspirants.

The philosophical development of the final cause introduces two important variants: first, the continuity of personal aspirations and behavior and the continuation of the species. As individuals aspire to immortality, they reproduce in order to persist in their descendants and thus contribute to the continuation of their species. The individual failure to become immortal becomes the inception to persist on a collective level. Personal choice, natural characteristics and proper behavior are the conditions for the continuity of life on earth. Whether species are literally inalterable or may gradually modify is a question left ambiguously unaddressed by Aristotle. The central idea is how the individual transmits the form and inversely a species depends on the performances and good health of its members.

The second variant is the value attributed to each and every living being. All living beings are defined as directional beings and as goals in themselves. Unlike human artifacts, living beings have or are capable of conceiving and pursuing specific purposes. They are not defined by their functions but by their goals. A goal is what seems best for its aspirant. Aristotle establishes the dignity of living beings on their absolute value as self-ends.

Conclusions

Today, the yin-yang theory attracts more attention as an overall pattern of describing practically all phenomena from inorganic matter to complex living organisms and from the supersymmetry theory of cosmology to the nanolevel of molecular biology. One is tempted to wonder whether a ubiquitous pattern provides an adequate explanation or merely perceives phenomena as the interaction of two opposite forces. In any case, it accords with the contemporary tendency to impersonalize scientific data.

Aristotle creates a detailed theory of finality and perceives all beings as goal-oriented. His theory has never seriously inspired intellectuals, let alone scientists.

The introduction of finality in the natural and man made world changes priorities. Technology has arrived at a crucial point where questions of ethical and existential order are pressing. The question of finality and purpose are discussed in the form of ethical doubts, regrets, wise warning, etc. It is all too clear that there is absence of forethought. Further, the question of purpose as inherent coefficient of growth and activity comes to the foreground with the advent of a new era in the production of artificial intelligence. Robots accumulate an enormous amount of data, comparable, before long, with human intelligence. The question of purpose, independently from their makers' planning, starts raising doubts. If robots are complex enough to compare with human activity, they may or may not develop a will of their own. The final cause is clearly inherent to the product without having been introduced by external agency. It all seems to work as if the accumulation of data comports by its nature its proper finality. What this entails in real situation is yet to find out.

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Marianna Benetatou

PhD, Greek philosophical Siciety

m.benetatou@yahoo.com

Yin – Yang – Taiji and the 5 phases´ rotation system as rational tools to explain psychosocial progress and risks.

Felix BADELT (Vienna / Austria)

Key words:

Yin-Yang - Taiji – a symbol of health; Thesis – Antithesis –Synthesis, Dysfunctional patterns of Bipolarity: Misbalance, severe Fluctuation, Conflicts, Deficiency of both opposites, 5 Phases´ Rotation System – a network, of Diversity in nature, Diversity in Psychology: Experiences of Contact; Care, Order and Responsibility; Motivation due to Self-Limitation; own Realization (effort); the network´s atmosphere; Wu-Xing describing Psychosocial Progress and Risks, excess or deficiency of phases; dysfunctional patterns in wu-xing, clockwise versus contra-clockwise promotion, diagonal suppression and disregard (instead of diagonal limitation), shortcuts, influences of environment and own life joy, Theory of Salutogenese (resilience based upon wholesome resources and dynamics), Psychosocial Complexity, interdisciplinary dialogue

1. Chapter: Harmonious cooperation of opposites in our thinking, feeling and behaviour as subjective standards for psychosocial progress

Illustration 1:
Taiji Symbol

Taiji can be regarded as a fundamental symbol describing healthful life. Generally it illustrates wholesomeness and cooperation (the circle around), well balanced dynamics of opposite constellations (the sinus wave), change of opposites throughout time (instead of conflicts of opposites), and both sides always being aware of each

other (each side including the nucleolus of its opposite aspect) – thus mutually generating each other.

Opposites and their ways of interactions enable us to describe rather stressful or healthful dynamics. Reflections upon several different opposite aspects concerning our thinking, feeling and behaviour (as illustrated in the table underneath) promote individual openness towards better balanced and more resilient actions and reactions – according to our individual life situations.

From a western psychological point of view Old Chinese Yin-Yang interpretations like passive- active, towards me – towards others, negative – positive, can be completed by use of an additional and fundamental pair of opposites - according to *Hegel´s* western dialectic philosophical concept: *Thesis (in the sense of any term) – Antithesis(in the sense of its opposite) – Synthesis (in the sense of appreciating both aspects to achieve a higher level of mind- experience)* which is here put into analogy with *Yin–Yang– Taiji*. Whereas openness towards more balance of opposite components in our thinking, feeling and behaviour usually go along with better social relations and psychosocial progress, dysfunctional patterns like misbalances, extreme fluctuations, conflicts or deficiencies of both opposite aspects easily lead to personal or social risks. Well balanced cooperation of opposite partners (resulting in "Taiji" or western "Synthesis") also resembles *Aristotle´s "mesotes"* and possible " *causae finales*", whereas dysfunctional constellations of opposite sides (appearing as dysfunctional patterns or "*causae formales"*, apart from*" mesotes*") can be understood as aberrations. Examples from everyday life will be presented. Besides the type Thesis – Antithesis, other common types of opposites in our thinking, behaviour and feeling are the traded types: active- passive; towards me – towards others; and: rather positive – negative.

In Table 1 examples for common pairs of opposites are listed up – anticipating the "5 phases´ rotation system" (see chapter 2) - here represented by the letters A, B, C, D, E, plus EA (EA interpreted as Evolutionary Atmosphere due to our lustful (or frustrating) exposition to spatial and temporal conditions respectively to our environment). Different kinds of social risks (last line in the table) usually go along with misbalances of bipolar aspects like listed up in the upper parts of the table. Moreover, risks can also be the results of deficiencies of both opposite aspects, of conflicts or of severe fluctuations of opposites.

Basic bipolar aspects in regard of the types:
Thesis – Antithesis; active- passive; towards others – towards me
and specific social risks

Phase; Type of opposite	A – contacts, experiences	B – storage, care	C- order, responsibility	D- self-limitation	E- self-development	EA: adaptation of distance, speed, lust
Thesis-Antithesis	together-alone; conscious – unconscious; (living – dead)	caution – trust; taking – giving; remember - forget	duty – right critical – forgiving; severe – tolerant; guilt - honour	demanding – content; competent – incompetent; determined - anxious	working – resting; aggressive-peaceful; strong - weak	lust, joy – no lust, joy; close – distant; speed up – slow down
active - passive	contacting-being contacted; loving – being loved	care – being cared	criticize – being criticised	own power-dependence leading – being leaded	succeeding - compliant, giving bye	lust – satisfaction speed up – feeling chased
towards others – towards me	sensitive towards others – towards me	caring, save for me – care, save for others	critical towards others – towards me	expect from others – expect from me	working for others (help) - work for me	(living) space, time, lust for others – for me
social risks - due to miss-balance, severe fluctuation or deficiency of both bipolar aspects	lonesome, lack of experiences; too close attached, over – identified, euphoric, drunk,	suspicious, over-burdened materialistic, spoilt, over-protective, waste of resources, poverty,	pedantic, too strict, dishonest, sloppy, confused, chaotic, criminal,	egoistic, fanatic, vain always discontented, full of demands; always anxious, aimless, too dependent, dumb	too competitive, aggressive, reckless, workaholic; lazy, weak helpless, always suppressed, abused	lecherous, over-stimulated, foolish, no time, no place, no lust for me or for others; frustration

Table 1

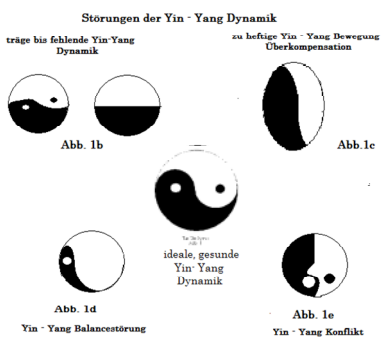
2. Chapter: Unwholesome dynamics of opposites

Illustration 2
Unwholesome dynamics of opposites

Dysfunctional patterns of Yin and Yang apart from Taiji in the center

- Reduced (too weak) activity
  (both opposite functions are deficient)
- Severe fluctuations of opposites

- Misbalance of opposites
- Opposite functions in conflict



2.1. the most frequent types of dysfunctional patterns are Misbalances of opposite components (see 1d). In these cases one side tends to overlook its partner (pictured by a deformed Tai-ji with a lost nucleolus in one aspect in the following). Thereby one aspect overlooks or suppresses its opposite (speaking with S. Freud: the weaker part easily becomes unconscious), speaking with C-G. Jung: Anima is repressed by Animus or vice verse.

As wholesomeness needs openness towards both opposite partners, any support of the deficient aspect is the prime aim coping with such constellations. Promotion can be performed by pronouncing or remembering the weaker aspect, by phantasm over it, eventually assisted by use of hypnotic techniques.

2.2. Besides misbalances also severe Fluctuations of opposites (see 1c, both nucleoli being lost) are usually combined with social risks. Deficiency of one aspect is often followed by its opposite, e.g. followed by excess. Not only patients with so called instable personality disorders (and their environment) can suffer under such constellations. Single severe fluctuations may be a sign of overcompensation (also described by S. Freud and A. Adler) e.g. prolonged suppression can be

overcompensated by severe aggression; lonesomeness can turn into severe clinging and vice verse; too severe trust in school medicine can be combined with a very suspicious attitude towards complementary medicine or vice verse. Pronouncing the significance of good cooperation of both opposites in a moderate way can be helpful and promote flexibility. We all know that this is much easier in theory than in practice.

2.3. Conflicts between opposites (see 1d) easily lead to psychosocial stagnation (instead of wholesome change of different aspects of our thinking, feeling and behavior). E.g. conflicts between my duties – your duties can hinder work efficiency; between closeness and distance hinder contacts; conflicts between demands from outside and own demands easily prolong personal stress, sometimes ending up in resignation.

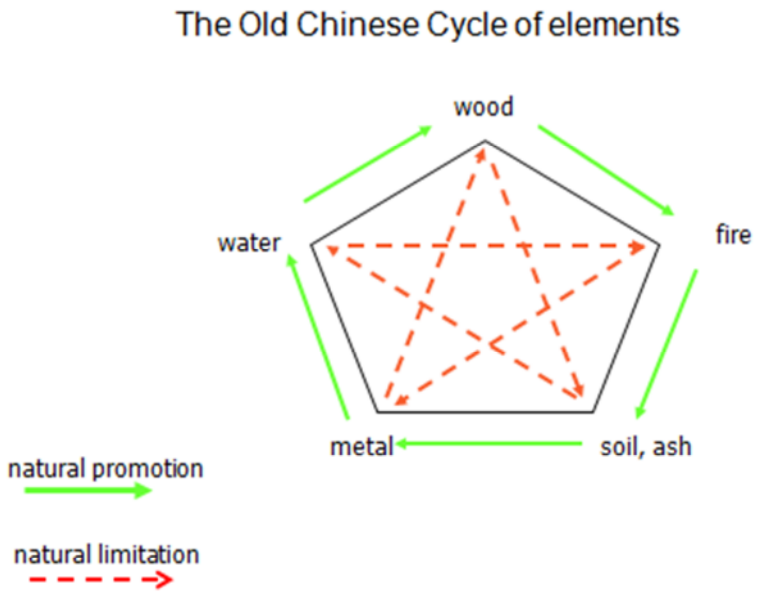
4. Deficiency or reduced (too weak) activity of both components (see 1b) bear the risk of deficiency of a whole domain (see chapters 3 and 4) – like reduced motivation combined with reduced satisfaction which can bear the risk of aimless indifference, easily going along with a feeling of senselessness. Another lack of both: e.g.: empathy and experiencing own feeling can end up in heartlessness , as well as a lack of contacting activity combined with a lack of admitting offered contacts can be a symptom of severe depression.

3. Chapter: The Five phases´ rotation system (Wu-Xing) from a western point of view

3a. Traditional Wu-Xing Interpretatios::

Whereas the *Yin–Yang* system describes *Bipolarity* in nature, *the five phases´ rotation system (Wu-Xing)* – in the West better known as the Traditional Chinese System of the 5 Elements – deals with cooperation or disintegration of the *Diverse* in nature and in us – being parts of this nature. In acupuncture literature this cooperation is illustrated by use of 5 Traditional Chinese Elements – circularly promoting and diagonally limiting each other, thus perpetuating balance among each other – see illustration 3:

Illustration 3



Natural *Limitation*: Water can limit (extinguish) fire, fire can limit (melt) metal, metal (and rocks) can limit (cut) growth of wood, wood can limit (use up) soil, soil can limit (suckle) water.

Natural Promotion: Water can promote growth of wood; Wood can produce (nurture) fire. Fire can produce ash and soil. Soil can produce metal (included in stones and hard surfaces). Metal (hard surfaces) can produce water, can enable springs. (At the first moment it seems as if this traditional system would not consider water evidently falling down (as rain) from the atmosphere – see interpretation in the next part 3.2.)

Apart from natural production and limitation also destructive interactions are traded – referring to that model: Dominating phases (elements) causing clockwise diagonal suppression, excessive phases (elements) causing contra clockwise diagonal disregard as well as movements against the clock. Such occurrences were traditionally used to explain illnesses. According to this way of thinking not only balance between opposites but also balance among main diverse aspects in nature and in us (as parts of nature) have to be considered.

Generally speaking the wu-xing system is based upon a concept of similarities, according to which different aspects of nature are similar (and thus closely related) to one of 5 main qualities or categories – listed up vertically in the table underneath.

Moreover these 5 different Qualities (appearing in different levels) are changing perpetually - thus influencing each other horizontally (cyclically) as described above. Both systems - the yin- yang system (the system of opposites) and the 5 categories of the diverse can be interpreted as different viewpoints (or tools) bringing order into the manifoldness of nature. In tables of acupuncture literature such (vertical) correspondences are presented like underneath:

Table 2
Table of traditional correspondences (examples)

Headline?	**?**	**?**	**?**	**?**	**?**
Element	fire	soil	metal	water	wood
phase of nature	(common) growth	gather (harvest)	retreat	latency, germinating	driving out
Season	early summer	late summer	autumn	winter	spring
emotion	joy	sorrow	grief	anxiety	anger
climate	warm	wet	dry	cold	windy
virtue	modesty	hope	honesty	wisdom	strength
sense	tongue (?) feeling! pain	tasting	smelling	hearing	seeing
Pair of meridians in acupuncture	Heart – Small intestine plus (Pericad - 3E)	Spleen, Pankreas – Stomach	Lung – Large intestine	Kidney – Urinary bladder	Liver - Gallbladder
Layers of body	blood vessels	body´s form	skin	bones	muscles
Taste	bitter	sweet	pungent	salty	sour

etc.					

3.2. Personal Elaboration of traditional Wu-Xing interpretations for today`s psychology

3.2.1. What I always missed where terms of basic ideas behind the five categories – useful as headlines, and conformable to traded correspondences (e.g. emotions, virtues, names of phases).
3.2.2. As life traditionally is based on yin-yang interactions, apparently bipolar attributions in each phase (like appearing as pairs of meridians) ought to be listed up (instead of single terms for emotions) –especially if such tables are applied to our thinking, behaviour and emotions (see Table 1 in Chapter 1).

3.2.3. Moreover the aspect of "systems nested in each other" should be considered – originally also stated in acupuncture literature, where in each pair of meridians each "element" is represented by a single acupuncture point – explaining strengthening and reducing effects upon "influence -qi "in single meridians. According to acupuncture theory with six pairs of main meridians in a system of just five categories [220] and the missing (western) element "air" in the traded Old Chinese elements (fire, soil, metal, water, wood) there is strong evidence that the whole wu-xing cycle is also regarded to be nested in something, which the author named evolutionary atmosphere (EA) – summarizing several influences (again on different levels) – we all are exposed to from outside and inside : 3.2.3.1:
Evidently we all are exposed to Space (to our environment).
3.2.3.2: We are exposed to Time and corresponding feelings (also represented by the change of phases).
3.2.3.3: Mentally we are exposed to and interacting by Language (including internet today)

[220] In corresponding tables the sixth pair: pericardium – triple warmer is usually explained together with the meridians heart – small intestine, describing a "tongue" (as corresponding sense!?- instead of pain) and modesty as corresponding virtue (instead of love)

3.2.3.4: Emotionally we can gain lust, life joy [221] (including entertainment) over each single phase – all these functions and influences corresponding to this sixth pair of main meridians (named pericardium – triple heater) - representing this outstanding and inside level, this atmosphere of our individual existence.

All components of this atmosphere have remarkable influence on the duration and thus on the weight of each of the five main qualities of this "Five Phases Rotation System" in ourselves – being nested in our atmosphere. Due to these considerations the (former) closed wu-xing system of the five phases changes into an open system – a picture of man´s existential situation.

The following table 3 as well as illustration 4 can be applied to psychology – also regarding headlines (ideas) of phases, letters (for abstraction), social qualities, cognitive functions, virtues plus a sixth column representing correspondences of the atmosphere EA.

Table 3

Table of correspondences – applied to psychology

Idea	**Ex – change**	*Prepare*	*purifying*	**Limits + Latency**	*realize*	Evolution by progress
letter	**A**	*B*	*C*	**D**	*E*	EA
virtue	*Love*	Hope	Honesty	Wisdom	*Peace,*	Adaptation to limits of space, time and lust

[221] In former French acupuncture literature as well as among single German (G. Bachmann) and Austrian authors (J. Bischko) the meridian "Pericardium" was named "Kreislauf – Sexualität".

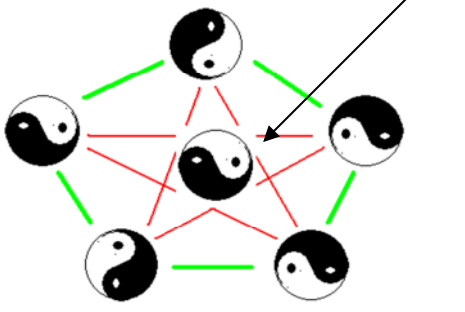
social quality	*contact*	*care*	*order, rules*	*self con-fidence*	*own effort*	timing, lust cooperation, adaptation
cognitive function	*being aware, ideas*	*keeping in mind*	*compare order*	*knowing wishing*	*working handling*	Language, integration, , internet, enter-tainment
phase	*growing together*	*gather*	*retreat*	*latency*	*riving out*	reproduction
element	*fire*	*soil*	*metal*	*water*	*wood*	Atmosphere, "air"

3.2.4 *"Natural" promotion and limitation among different psychosocial domains*

Today *Wu –Xing* can be interpreted as a cybernetic network – describing changes and interactions of main diverse aspects in nature and human beings. As mentioned above, processes of interactions can be illustrated with a pentagram and its diagonals, perpetuating stability in the system by clockwise promotion and diagonal (clockwise) limitation among the 5 different partners.

With the help of the same network – now applied to psychology – five main social aspects (Contact-A, Care -B, Order + Responsibility- C, Motivation due to Self-limitation- D and own Realization (effort)-E) can be differentiated, which are interacting in the same way as the "Chinese elements" fire, soil, metal, water and wood. To underline this hypothesis, typical examples of behaviour, emotions and thought patterns are attributed to each of the five aspects. Each phase (main quality) is characterised by some typical pairs of opposites, which are listed up in the sense of thesis – antithesis, active – passive, towards oneself – towards others as well as positive – negative. (See table 1).

Such a combination of Yin-Yang bipolarity nested in an elaborated Wu-Xing system – now appearing as one complex system – is illustrated in figure 4 with a Taiji –Symbol and its stepwise rotation.



Different aspects of our Atmosphere describing influences of environment (culture, politics), perception of limited time; language+ internet; lust, libido and entertainment

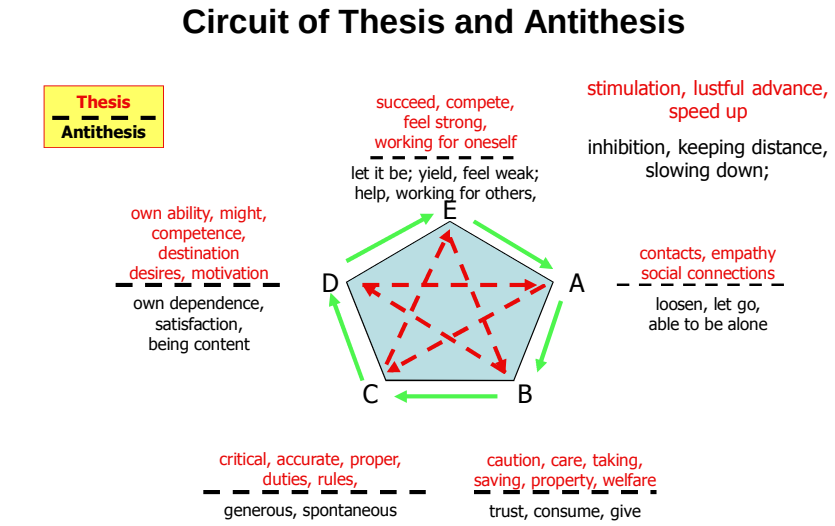
Illustration 4
Clockwise rotation of Taiji
(yin-yang -taiji and wu-xing – additionally nested in atmosphere)

Harmonious psychosocial progress easier goes along with clockwise support and diagonal limitation of their components– equally distributed influences of environment and sufficient own libido close to all phases – especially to the phase "contact" – provided. [222]

Thesis and Antithesis of a phase directly promote each other clockwise as well as they limit each other diagonally – as described with the help of illustration 5:

[222] According to traditional interpretations in acupuncture literature, relations and qualities of the corresponding sixth pair of main meridians (pericardium –triple warmer) are very close to phase A (fire) and (in regard of "yue-yin" and "shao yang" relations in acupuncture) to the meridians liver – gallbladder, corresponding to element wood (phase E) – both aspects were the reasons why I choose the letter combination EA – also describing the atmosphere`s main quality – though its interaction with all phases. Additionally the meridian: " triple warmer" traditionally nourishes "kidney fire", a part of phase D (element water) – perhaps (if the acupuncture - relations are now transferred to elements) a correspondence of water (rain) also nourished from the atmosphere.

Illustration 5
Circuit of Thesis and Antithesis



1.Balance of Thesis + Antithesis in one phase naturally furthers balanced polarity in next phase.

2. Thesis of one phase should (naturally) inhibit thesis of next but one phase and thus indirectly further antithesis in that phase - shortcuts excepted (see dysfunctional patterns)

<u>Cycle of natural Promotion</u> among different psychosocial domains (examples):

1. Empathy, positive or negative experiences of contacts (see phase A) naturally promote care (see phase B).

2. Care should naturally promote responsibility, fairness and rules (see phase C).

3. Responsibility, fairness and rules "naturally" promote self-limitation and personal motivation, personal insight, own social position and power - based upon competence (see Thesis and Antithesis in phase D).

4. Phase D promoting phase E: Personal competence should be put into practice – naturally promoting rather help than competition; plans and wishes should be realized, tried out; strong personal desires easily make aggressive – whereas self limitation naturally promotes helpful cooperation; personal stress, tension naturally promotes aggression

5. Phase E promoting phase A: Cooperative behaviour, personal work efficiency

naturally promote (rather positive) experiences and contacts, whereas aggression naturally causes pain and disappointment (all aspects of phase A)

Diagonal limitation among the different domains:

1. Thesis of phase A limiting thesis of phase C (thus non-directly promoting its Antithesis):
   Empathy naturally limits criticism (thus non- directly promoting tolerance).

2. Thesis of phase C limiting Thesis of phase E:
   Responsibility, rules and criticism naturally limit personal aggression and force (thus non- directly promoting help and peaceful consideration).
3. Thesis of Phase E limiting thesis of phase B:
   Personal effort, competitive work (or cooperation) naturally limit caution and care (thus non- directly promoting trust).
4. Thesis of Phase B limiting Thesis of phase D:
   Care and Caution naturally limit feelings of competence, own motivation (thus non-directly promoting feelings of openness, sometimes anxiousness, feelings of dependency or incompetence);
5. Thesis of phase D limiting thesis of Phase A: Individuality, personal limits and demands naturally limit empathy, contacts and amount of experiences (thus non-directly promoting reduced feelings and staying alone).

Based upon such combinations of different types of Bipolarity among different domains of Diversity, the following illustration 6 describes a basic framework for psychology – basic bipolar aspects concerning our thinking, feeling and behaviour and the complexity of possible relations – additionally in consideration of the atmosphere to which all the pairs of opposites are exposed to.

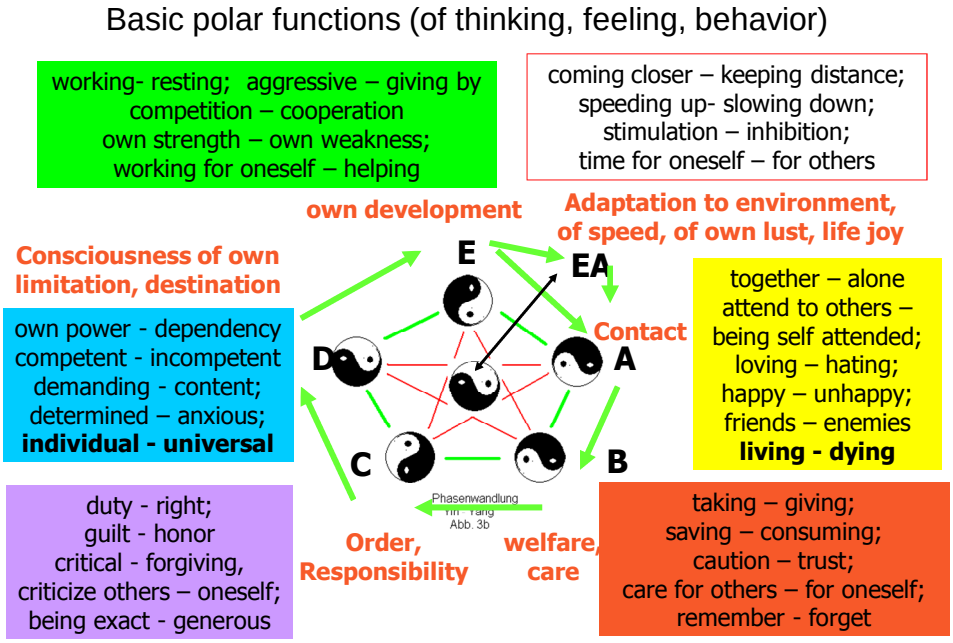
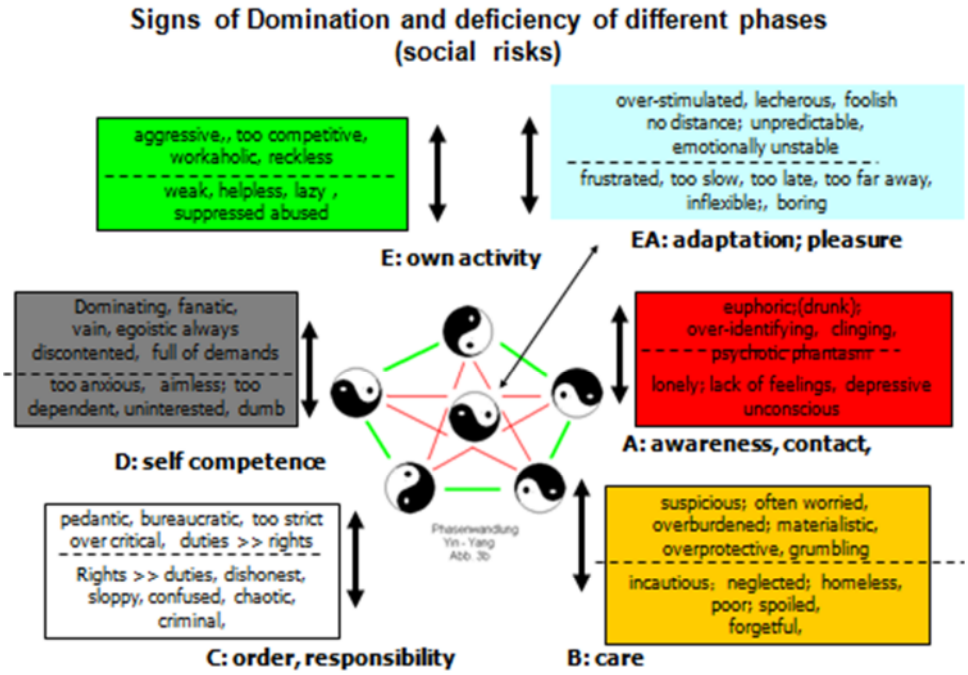


Illustration 6
Basic polar aspects (of thinking, feeling, behaviour)

The whole system can be used like a map on our way of life, useful to describe both: psychosocial progress and psychosocial risks – the risks as illustrated underneath in illustration 7 (signs of domination or deficiency in single phases.

4. Chapter: Dysfunctional patterns in the "5 Phases´ rotation system"

Illustration 7
Signs of domination or deficiency of different phases
(social risks)



Besides dysfunctional patterns of bipolarity, summarized in chapter two (misbalances, severe shifting, lack of both opposites, conflicts), the theory of wu-xing offers additional explanations of risky dynamics as far as changes of phases are concerned. Coping with such risky dynamics needs non direct coping strategies – derived from the same theory:

4.1. Contra- clockwise phase rotation (and or mutual stimulation of phases in neighborhood) – causing dominance of single phases.

4.2. Dominance of phases causing (diagonal) suppression or disregard towards the last but one phase

4.3. Diagonal Shortcuts – neglecting a single phase in between (promotion instead of limitation through the next but one phase – usually ending up in double domination of the corresponding phases)

4.4a. Pleasure and lust unequally distributed among the different domains

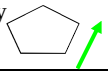
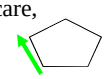
4.4b. Combined influences of environment, culture and politics - promoting or suppressing single polar aspects in different phases.

In the following, several examples taken from everyday life should illustrate different appearances of such dysfunctional patterns among different domains.

4.1. *Clockwise versus contra-clockwise rotation. See following illustrations 8 (Parts 1 and 2)*

Illustration 8/1and 2
Clockwise versus contra-clockwise rotation

Clockwise versus contra -clockwise rotation (examples, Part 1)

clockwise rotation – leaving behind the phase before	Contra clockwise rotation - leaving behind the phase before
A -> B: Positive or negative contacts and experiences furthering care, caution, (leaving behind own work, effort) . Trust based upon sympathy, friendship ; Property out of partnership, friendship, family  Memory out of mindfulness, experiences	B -> A: Care, caution, property furthering contact, emotions (leaving behind critic, honor, responsibility); friendship, contacts primarily due to gifts. Experiences nourished from memory, past , Happiness primarily due to property and consume (of resources) 
B - > C: Care, property furthering responsibility, fairness; Criticism out of care; forgiving out of trust, (leaving behind emotions, contact, experiences), Evaluation ,examinations based upon (memorized) upon collected data 	C - > B: Care, caution, property due to criticism, order, responsibility (leaving behind own wishes , own limits, own claims,) social support primarily based upon law and order, leaving behind personal needs 
C -> D: Examination, shame, praise furthering new position, intentions, claims; limits due to rules, leaving behind care, property). Power due to law, fairness furthering self limitation 	D -> C: critic, order, responsibility due to personal position, claims (leaving behind own work, effort). Decisions made before critical examination; right due to own position; lies due to anxiousness ; 

Clockwise versus contra clockwise rotation – examples
Part 2

clockwise rotation – leaving behind the phase before	Contra clockwise rotation – leaving behind the phase before
D -> E :Own position, claims, needs, own limits further own effort, work (leaving behind criticism, duties responsibility) Aggressive competition due to egoism 	E:-> D: Own position, limits, claims, due to own effort, competitive work (leaving behind contacts, empathy) Aggressive struggling for higher position, more power 
E -> A: Own work, effort furthering contact, emotions (reducing own claims, limits). Experiences due to activity. Competition furthering joy?? or rather disappointment. 	A -> E: Own work due to contacts; emotional activity (reducing care, caution). Aggression due to antipathy, hate. Inactivity due to disappointment 

Non direct coping strategies try to draw more attention to opposite aspects of the clockwise following phase.

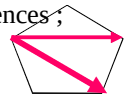
4.2. Diagonal suppression and/ or contra-clockwise diagonal disregard:

In diagonal suppression natural limitation is exaggerated due to a dominant phase, whereas in contra-clockwise diagonal disregard the roles of naturally controlling and controlled phase are perverted by excess of the naturally controlled domain.

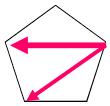
Illustration 9/1 and 2
Diagonal suppression and/or contraclockwise diagonal disregard

Diagonal Suppression (>>) and Disregard (>>>) Part 1

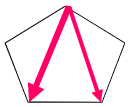
- Phase D >> phase A:
  Egoism and severe stress can suppress love, contact , experiences ;
  Stubbornness suppressing empathy
- D>>>B: Fanaticism can make careless



- Phase A >> phase C: Strong feelings, Idealism or hate making uncritical ,
  Phantasm, euphoric conditions causing chaotic thinking ,
  A>>>D: Too tight (religious, political) bindings , idealism
  can disregard the self and make totally dependent

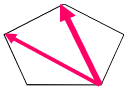


- Phase E>> phase B: Force making careless, poor;
  Wars , robbery or reckless competition destroying resources,
  property ,
  E>>>C: Reckless competition making irresponsible;
  wars disregarding laws, making unscrupulous
-

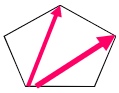


Diagonal Suppression (>>) and Disregard (>>>) Part 2

- Dominant Phase B >> (suppresses) phase D:
  Over caution can suppress own aims;
  B >>>E: Severe grumbling or feelings of being overburdened
  can destroy own working
  efficiency, ;



- Phase C>> phase E: Severe guilt or compulsion suppressing own activity
  making shy, timid
  C>>>A: Compulsion, severe shame, laws and rules destroying or forbidding
  contact, love, or showing true sympathy or antipathy
-

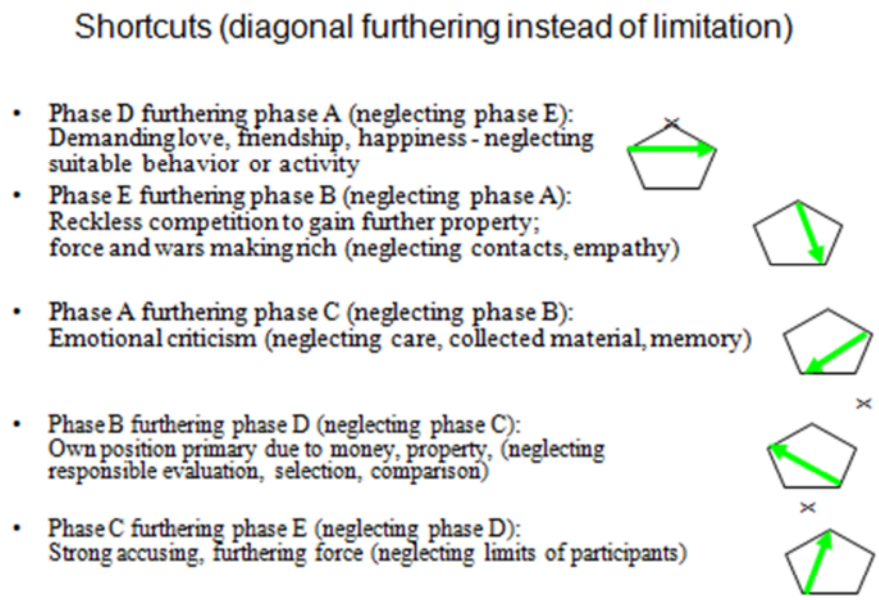


According to an Old Chinese rule, that “a mother uses to support her child” and “a child uses to weaken his mother” non direct coping strategies will try to support the suppressed over next phase non- directly by concentrating upon opposites of the phase following (“the child”) the suppressing, excessive (“mother”) phase. – see Illustrations 9 (parts 1 and 2)

4.3. Shortcuts:

Shortcuts describe diagonal promotion instead of diagonal limitation, neglecting the phase in between as presented in illustration 10. Non direct coping strategies will naturally concentrate upon both opposite aspects of the neglected phase in-between.

Illustration 10 Shortcuts



4.4a. Influences of own lust (quality EA,) if much closer to any phase except to phase A (lustful experiences, lustful contacts).

In cases of balance in the system, lust and life joy can be gained in every phase - in phase A (over contacts, experiences), in phase B (over property, consummation), in phase C (over honour, recommendation, praising), in phase D (over personal knowledge, power, competence, personal interests) in phase E (over working activity, personal effort, sports) and in quality EA (by lustful sex usually based upon adaptation and integration to environment, or lust by entertainment and by travelling – today also partly through internet.

Inadequate or suppressed life joy in phase A (contacts, experiences) easily is overcompensated by symptoms of excess in other phases e.g. in some cases of lust only derived from own power and knowledge, (easily leading to phase D excess), lustful workaholics, lustful arguing, lustful violence, (excessive phase E), raised

lustful materialism (excessive phase B) or lust hidden behind excessive criticism, behind compulsive bureaucracy (excessive phase C).

4.4b. Mixed influences of culture and environment upon our personal network

Last but not least this way of thinking can encourage looking upon combined risks– primarily due to a typical western "atmosphere". Perhaps Old Chinese patterns can help to avoid falling into some of these traps.

1. Raised Phase D suppressing phase A (D >>A)

   In our western culture permanent advertising easily leads to raised personal demands in phase D, going along with impeded personal satisfaction (Antithesis of phase D). This naturally promotes raised (aggressive?) competition in phase E. According to the system, a dominant Phase D easily suppresses phase A diagonally - leading to a lack of (positive) experiences, sometimes making lonely or depressive. To avoid such feelings, in western cultures experiences are primarily gained by different sorts of entertainment (quality EA) – replacing personal contacts and empathy (an important quality of phase A), in the long run sometimes leading to inactivity and thus making even more lonely.

2. EA > A: Additionally, further acceleration of life rather reduces the quality of our experiences, in phase A - hindering us to be present and thus impeding mindfulness in phase A.

3. Contraclockwise rotation from B to A: advertising continually promises happiness and positive experiences (phase A) primarily based upon consumption and property (phase B) instead of positive experiences and happiness primarily being based on own activity and cooperation (Phase E, including quality EA). Such dynamics correspond to a contra-clockwise promotion from phase B to A, bearing the risk of deficient responsibility (a feature of phase C.).

4. Shortcuts between phase E and Phase B (neglecting phase A):

   On one hand working only to gain much income and property easily leads to neglect of personal contacts and own feelings (aspects of phase A) – both naturally promoted by well balanced personal activity and effort.

5. E>> B: On the other side aggressive competition can easily suppress own caution (Phase B) being a natural source of fairness and conscientiousness (attributed to phase C), whereas more helpful cooperation (a well balanced phase E) naturally can promote contacts, positive experiences (in phase A), and enough income and welfare (in phase B).

6. Mutual stimulation of the phases E and D in neighborhood describe a main tragedy of individuals and of mankind in several cultures throughout centuries.

On the personal level continuous arguing or reckless force (excessive phase E) are often used to gain a leading position and more power (phase D), as well as personal selfishness naturally leads to reckless competition and aggressive force (a raised phase E). Such habits of behavior – also being mirrored on a national level – easily end up in wars (excessive phase E) due to fanatic nationalism (excessive phase D) - naturally promoting even more force and reckless activity (excessive phase E) – usually producing helpless victims (deficient phase E due to severe fluctuation of bipolarity) or ending up in damage of the whole cycle and in personal death – an existential antithesis of phase A. Death – a natural but senseless result in cases of wars because interrupting chances of personal development – can only to be regarded positively in as far death means relief from severe pain and suffering (negative aspects of phase A).

Conclusion:

Old Chinese patterns like Yin-Yang-Taiji and the 5 phases rotation system – adapted and elaborated for today's psychology by placing suitable western terms into them – encourages reflecting upon our ways of thinking, feeling and behavior. Such a systemic viewpoint offers a comprehensive concept of "Salutogenese" (of wholesome resilience, resources and life strategies) and thus can explain both: Integration of opposites and integration of the diverse in and between us – both possible standards for social progress. Additionally the systems also are useful to describe several mechanisms of social risks due to several dysfunctional patterns.

In practice reduction of complexity by concentrating upon single pairs of opposites or single phases facilitates helping ourselves. In more severe cases professional psychological treatment is indicated – eventually assisted by acupuncture or hypnotic techniques. The systems above offer both: comprehensive insights into the complexity of a client and his problems as well as different possibilities of a "step by step treatment" based upon these theories.

Last but not least this access to Old Chinese Philosophy of nature can promote interdisciplinary dialogues between philosophy, (medical) psychology, sociology and educational sciences.

Felix Badelt, Dr. med.,
Diplomas for acupuncture and psychosomatic medicine,
Vienna, Austria
www.ganzheitsmedizin-badelt.at /English
psy.feba@gmx.at;

The ‘Co-Existence’ of Human, Culture and Nature
– In search of a new cognition for a global world

HYLOZOISM, TRIADICITY, MANIFESTATION: ECHOES FROM THE MICROWORLD

Leonardo CHIATTI (Viterbo / Italy)

A philosophy of nature that aspire to be more than a mere philosophy of natural sciences must propose, as the core of its reflection, the recovery of the cosmological notion of *manifestation*, as the process that connects the Wholeness and the manifold, the *Natura Naturans* and *Natura Naturata*. It must accomplish this in line with the current scientific understanding of nature.

Introduction

The Philosophy of Nature is a key argument of this symposium and I begin this paper posing the question: what is or should be really a philosophy of nature? Today we have the philosophy of science, the epistemology, the philosophy of single natural sciences such as philosophy of physics, philosophy of biology and so on. In what the philosophy of nature is distinct from these areas of research, to which it is any way connected? What distinguishes or should distinguish the philosophy of nature from these other disciplines?

Of course there are many possible answers to this question, according to different points of view and different notions of "natural philosophy." Following my personal choice, I will assume that the distinctive trait, the peculiar characteristic of philosophy of nature consists of the central role that the process of manifestation plays or should play in it. That is the process that connects the oneness and the manifold, the eternal and the transient, *Natura Naturans* and *Natura Naturata*. This concept has been virtually wiped off by the scientific revolution of the seventeenth century; some preliminary definition is thus suitable.

World as Manifestation

The manifestation is the process that brings out the phenomenal reality. The phenomenal world is assumed to be the visible representation of scaffoldings of reality which are not directly accessible to experience. The relation between these scaffoldings and visible representations constitutes a generative order: the same that

connects a leaf to the tree branch or trunk. I mean therefore something of very different from a merely descriptive order as, for example, that connecting general laws to particular occurrences. In other words, the "matter" or "substance" as commonly it is understood is not an absolute, but the outcome of a process that connects the individual contingencies through patterns (which we may call "archetypes") beyond spacetime and ordinary efficient causality. I propose here a broader concept of matter than usual today, may be closer to similar concepts from traditional cosmologies. On the other hand, nowadays the choice to re-evaluate the concept of nature as manifestation, making of it the core of a "philosophy of nature", must be compatible with the results of the natural sciences. Otherwise, such a choice would be an unrealistic and romantic escape in the archaic. But what the natural sciences have to say on this? In this presentation I will refer, without going into technical details and in a non systematic way, to some personal reflections stimulated by my research on the foundations of physics. I will make specific reference to the microphysics, with a focus on two concepts that seem relevant in this analysis: those of microevent and quark.

The ontology of elementary particles

We all know that the material world is made of elementary particles: things such as electrons, protons, photons and so on. The microevents are the events that happen to the elementary particles. In Figures 1-2, I tried to represent the history of a particle of light, a photon, from its creation in the incandescent filament of a light bulb until it is absorbed by a material. In the latter event, which is very short, almost instantaneous, the photon comes to occupy a point in space: one where its absorption occurs. But where was the photon before this event? Even better: what was it?

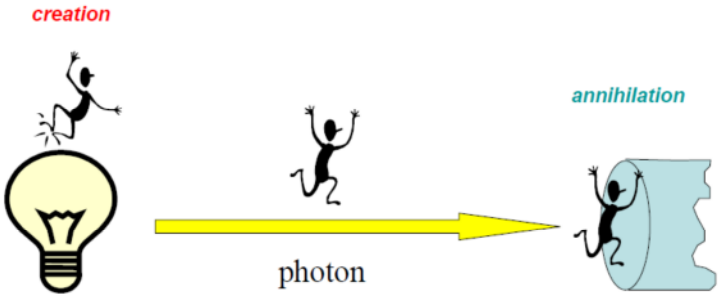


Fig.1 The classical view

In the classical view (Fig.1) the photon is an object. It is therefore a *persistent unit of substance*, that at each instant of time occupies a *well-defined position in space* and is *the bearer of its attributes*. This object thus follows a trajectory that leads from the source (the lamp) to the absorption point. The causality involved in this process is the *efficient causality*. We will say also that it is a causality of *diachronic* type, because the single act of motion of the photon along its trajectory depends on the act immediately preceding it and the conditions present in the neighborhood of the photon at that instant. If the experiment is repeated maintaining these parameters identical, the photon trajectory will be therefore exactly the same. A mechanical *determinism* thus will hold.

In a manifestation-based view (Fig. 2) the story is rather different. The photon is manifested, and it exists only as a collection of two events: its creation in the lamp and its annihilation in the material. What are actually created and annihilated are the attributes that make up the photon: this latter is identified with its physical state. There is not a persistent object, neither a position in space nor a substance bearer of attributes. There are only two *events* connected by an *extra-spatiotemporal* link. The causality involved in this process can be considered as a case of *formal causation*. We could say also that it represents a form of *synchronic* causality, because separate events in space "emerge in block" by a single *extra-spatiotemporal background*. These events consist respectively of emanation of attributes from this invisible background and their reabsorption in it.

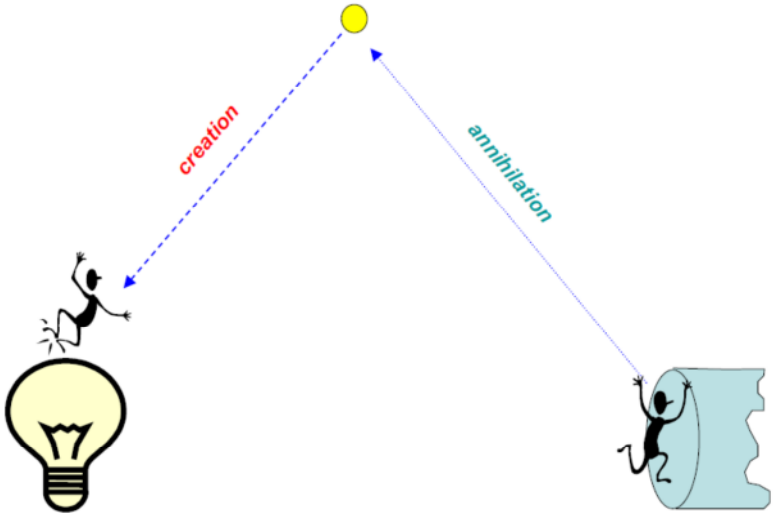


Fig.2 The manifested photon

There is an important detail in this vision, on which it is good to linger. The photon is manifested in correspondence of its material relations with other particles: those of the lamp and the absorber. These relations, the so-called microevents or interactions, are ultimately relations between physical states because particles are identified with their states. These microevents form what we call "matter." The basis of matter is therefore the *relationship*, and this relationship brings out the spatiotemporal ordering of events from a background which is outside the spacetime. This basic all-pervading background precursor of spacetime is the true environment of relations. It is (at the physical level) what Professor Hisaki calls the "Field of Between" [1].

Classical ontology or manifestation? An experimental approach

Well. But which of the two versions of the photon is true, or at least best consistent with available experimental data? I will answer very briefly: the second. We can see this in many ways; one of the simplest is the famous double slit experience. If the photon is a persistent object permanently localized in space, it would follow a trajectory from the source to a well-defined position on the rear screen; there would not therefore any self-interference. The observation of the interference fringes on the rear screen is therefore a proof of the non-substantive nature of the photon. But there are many others.

For example, if the creation of the photon and its subsequent annihilation emerge in block from an extra-spatiotemporal background, this phenomenon will be defined only by defining the entire block: generation-propagation-absorption of the photon, which is a self-generated acausal cycle. If, in the several repetitions of a certain experiment, a smaller number of elements is fixed, for example only generation and propagation modalities, the remaining elements (in our case the absorption) may vary, according to several modalities of self-reflexive coupling. The nature will choose them at will and the probability distribution of these choices will be defined by the assigned elements. This is the *quantum randomness*, which so frightened the researchers who discovered it in the '20s-'30s. For example, preparing in the same way and under the same conditions more photons, these will be absorbed at different points of a photographic plate according to a certain probability distribution. Is not possible to predict where a particular photon will be absorbed.

The nature exhibits therefore a creative behavior on the quantum scale. This behavior is not compatible with the classical view. I will not pursue this subject here, except to mention that in particular physical systems are operating amplification processes able to make macroscopic the effects of the "creativity" manifested at the quantum level, causing them to break into macroscopic reality: the reality of everyday life. This certainly occurs in artificial systems such as particle detectors, whose best-known popular example is the Geiger-Müller counter, which translates a microevent in an audible "click". But above all this happens in nature in living systems, in which this random background feeds macroscopic processes organized in biosemiotical architectures. The quantum randomness could thus induce choices endowed with meaning [2]. In this sense, therefore, the matter is very different from the passive and inert polarity with which it is interpreted by a certain philosophical tradition. Conversely, matter is activity, and it is in this sense that the perspective of hylozoism deserves to be re-evaluated. An other possible lesson from Aristotle.

Revisiting causation

Causality as understood in the currently usual sense lives in time domain, it is therefore diachronic; that implied in the process of manifestation is synchronic. According to Aristotle classification the first is efficient causality, the latter is perhaps best framed as a "causa formalis". Following the well-known example of Aristotle, we are dealing with something that looks like the work of the artist which "informs" the

marble, drawing a statue. The artist's action is the "formal cause" of the statue. In fact, the Aristotelian concept of "information" is much broader than that of the classical Shannon theory, associated with the coding and transmission of messages, which forms the basis of modern technology of telecommunications and informatics. In science, especially in biology and in the study of complex systems, the need of a recovery of the Aristotelian concept of information in its original scope is deeply felt. There have also been approaches to the interpretation of the manifestation on quantum scale by means of Aristotelian concepts of information and hylozoism. The most important was perhaps that of "active information", promoted in particular by Basil Hiley [3], a former associate of Bohm at the Imperial College in London. These concepts are now widely disseminated even in academic circles. It 's inevitable that manifestation is interpreted in platonic terms, and terms as "quantum Neoplatonism" are rather common these days, as evidenced for example in [4]. The study [5] explores the parallels between microphysics and language in terms of manifestation, which is described as "neoplatonic approach". There are also several blogs devoted to quantum neoplatonism. However, as we have seen, even Aristotle gives us important clues to the understanding of these problems. In a sense, Aristotle meets Plato at quantum scale.

There are many contributions which attempt to re-interpret microphysics in these terms. The road was opened by David Bohm in 1980, with his famous book "Wholeness and Implicate Order" [6]. Since then, many other studies have been published on this subject. For example, we can mention the "Pondicherry interpretation of quantum mechanics" of Ulrich Mohroff. Mohroff provided, in various specialized papers [7,8], a complete explaination of the current formalism of quantum mechanics based on exactly the idea of manifestation. Mohroff openly admits the influence by the teachings of Sri Aurobindo and more generally by the vedantic cosmology.

A question is mandatory: to what extent is the idea of a stage of manifestation preceding the spatiotemporal and causal (in the usual sense of efficient causality) order scientifically sustainable? The answer can be found in a phenomenon called "entanglement", and especially in a particular aspect of this phenomenon called "non-locality". The non-locality is now an ascertained aspect of the physical world, having been experimentally observed in many "entangled" physical systems. In order to illustrate the concept, we come back to the photon example and introduce a variant. Let us suppose that in a single microevent inside the lamp is not a single photon to be

produced, but instead a pair of photons. The two photons can then be directed towards measuring apparatuses in different places, for example one in Tokyo the other in New York. Now, it is possible to produce pair of photons with correlated properties, for example the polarization. It’s easy to understand that the nature of this correlation is very different depending on the photon fate is predicted by the classical view, represented in Fig.3, or instead by the manifestation, represented in Fig.4. If the photons are objects and the polarization is an attribute of these objects, the correlation between their polarizations is defined at the time of their joint creation in the lamp and then stored as a memory when the objects fly apart. The joint probability of polarizations as revealed by statistical analysis of actually measured polarization values must be of a certain type, since it will have to obey the constraint of separable photons. This constraint, however, does not apply if the photons are manifested. In this latter case, to be actually expressed are the properties, that is the polarizations. They do not travel "attached" to objects moving in space; instead, they are directly created in the measuring apparatuses. They are not separable. As a matter of fact, the statistics of these microevents violates the constraint of separable photons, thus confirming that photons are manifested. These phenomena are called EPR phenomena from the initials of Einstein, Podolski and Rosen, the first to formulate these topics in 1935 [9]. Another interesting aspect of them is the following. The manifestation of the pair of events takes place in block; it is not separable, and EPR phenomena stem from this fact. These phenomena thus support the eternalist vision of the "block universe" proposed by thinkers like Putnam or Rietdijk [10,11]. However, the researcher can freely choose how to conduct the experiment, for example, along which axes to measure the polarization. In other words, block universe and free will do not contradict each other but instead agree: only the actually performed choices become part of the manifested block. That is, we have a physical world whose basis is timeless but whose events are compatible with free choices here and now. Even this topic has been hotly debated, see for example [12].

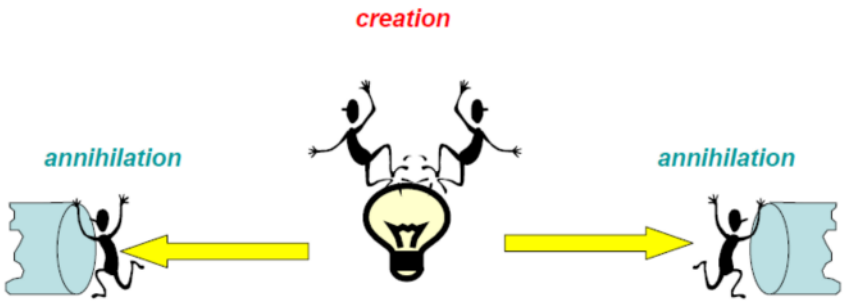


Fig.3 The classical view

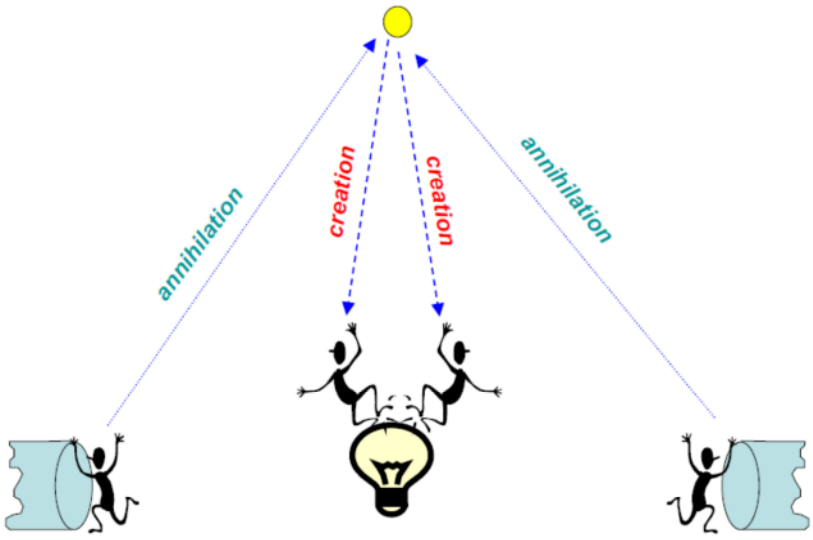


Fig.4 Manifestation of a pair of correlated photons

However, it must not be thought that these arguments are born with recent experimental developments. In 1927, year of the official birth of quantum mechanics, Bertrand Russell immediately understood these implications and discussed them on philosophical basis in his famous "Analysis of Matter" [13]. Russell says:

On all these grounds, persistent units of matter, though still convenient, have no longer the metaphysical status that they were formerly supposed to have.

We perceive events, not substances; …. And what we can primarily infer from percepts are group of events, again not substances. It is a mere linguistic convenience

to regard a group of events as states of a "thing" or "substance" or "piece of matter"…

From Aristotle to quarks

Coming back to Aristotle, it is clear that the synchronic formal causality cannot be mapped on diachronic efficient causality; that is, on what still today is the only form of causation considered as "scientific" by many researchers. Are there other areas of microphysics where phenomena appear which are unexplainable with the first form of causation but not with the second? The answer is possibly affirmative, and it is here that quarks come into play. Quarks make their first appearance in 1964 [14] as an attempt to explain the unexpected number of strongly interacting elementary particles (called hadrons) discovered in cosmic rays and accelerators. It was proposed the idea that all hadrons are different combinations of a limited number of smaller particles called quarks. This is a typical example of a reductionist approach, which until then had worked without problems in studying the structure of matter.

For example, Fig. 5 represents the structure of a proton according to the quark model. Quarks are seen as objects endowed with two attributes: colour and flavour. Obviously these names have nothing to do with the homonymous human sensations. The flavour can be of different types, the most common being "up" and "down". Each quark can then be in one of three colour states: red, green or blue. The proton, for example, is made of three quarks of two different "flavours" (up and down) and three different "colours" (red, green and blue) so that the proton total colour is white. This last fact represents a general property, as we shall see.

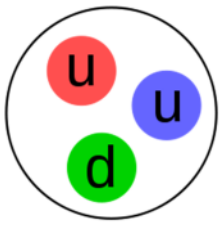


Fig. 5 Proton quark structure

All hadrons can then be described as combinations of quarks of different colour, flavour and other properties. These combinations are all and only those that meet certain mathematical rules, dominated by the number three. The question arises of what are really the quarks and their combinations fitting these patterns. Initially it was thought that the properties of the mutual interactions between hadrons were such as to produce these patterns. Quarks were therefore only completely fictional mathematical constructs associated with symmetries of these forces. This vision was thrown into crisis in 1968, when quarks inside a hadron were finally seen. This was made possible by the development of immense apparatuses as the linear accelerator of the University of Stanford, which were essentially ultra-microscopes powerful enough to highlight the quarks inside the proton. Quarks would be therefore objects instead of abstract entities.

It was soon realized, however, that things were not so simple. If quarks are objects, at least one particular physical state exists for them which is independent from the rest of the world. They should therefore be separable, when in this state. However, the outcome of intense research surveys was that quarks do not exist free in nature, neither in the rocks nor in the sea or in space. Quarks only exist in combinations of null triality, that is, such that by dividing for three the difference between the number of combined quark and antiquarks an integer number is obtained without rest. Another way of saying the same thing is that only aggregates of quarks with total white colour exist. These aggregates are the hadrons, like the proton.

One might then think of using brute force and rip with violence a quark from a hadron. But what happens if we try to do this? It happens that the energy that we invest in this operation is converted into creation of quark-antiquark pairs with opposite qualities. And thus generated quarks recombine to give exactly white hadrons with null triality; this phenomenon is called the confinement. Most physicists believe that the explanation of the confinement should be based on diachronic efficient causality. Each quark would be linked to each other by very particular forces, increasing with distance, a bit like springs. Strongly pulling the ends of a spring would become more likely the breakage of the spring than its further elongation. The breakage would generate two springs, and then again hadrons. Despite of some findings of great interest we have not yet been able to solve, with this approach, the confinement problem. It is then legitimate to seek for other approaches. One of the possible roads is to see quarks as aspects of the hadron manifestation in block. This process, as we

have seen, is synchronic and involves a formal causality that is irreducible to the conventional efficient causality.

The process of manifestation involves the production of signs. It is natural to analyze this process from the point of view of Peirce semiotics that, as we know, is also applicable to natural systems. According to Peirce, the structure of semiosis is triadic because it involves an Object, a Representamen and an Interpretant. It is therefore natural to ask if the hadron manifestation (which is a vertical process) can be also interpreted, at least partially, in terms of the horizontal process of semiosis. The idea of a hadron semiosis understood as mutual co-creation of quark has led in recent years to theoretical proposals able to reproduce the essential characteristics of hadrons and explain the confinement [15-17]. We can therefore hypothesize semiosis as an intermediate layer of the emergence of spatiotemporal and causal (in the currently usual sense) order from the "Field of Between".

Conclusions

Matter appears, in manifestation process, as the set of events of emergence of certain qualities from the background (creation) or involution of other qualities into the background (annihilation). This could be a general scheme of cosmogenesis, also applicable to domains other than physical world. In fact, an important aspect of the background is that not only it represents the world, but it represents it *to itself* [18] in self-reflexive cyclic connections. Subjectivity therefore naturally arises on each scale of manifestation, and we remind to ref. [2] for a discussion of atomic *qualia* in this context.

A central aspect of philosophy of nature should be the exploration of this "Field of Between", a concept bridging nature and society. In this context, a re-evaluation of Aristotelian theory of causation seems necessary: the efficient and diachronic causality is not sufficient to describe the world around us.

Philosophy of nature could be the natural place for comparative research about classical (*i.e.* traditional) and modern cosmologies, and their practical applications in ethics, medicine, technology and society. This field of exploration is of interest for natural scientists as well as researchers in humanities, therapists and philosophers.

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Leonardo Chiatti

ASL VT Medical Physics Laboratory Viterbo,

Viterbo by Rome, Italy

leonardo.chiatti@asl.vt.it

Spiritual Power and Hierarchy of Nature in Ancient Japanese Myths

Takao TAKAHASHI (Kumamoto/Japan)

Nature as a Life

It can be said that, even now, a considerable number of Japanese people regard nature, including animals, plants and various ecosystems such as mountains, rivers, seas, and land, as having lives. For example, we can often see in the precincts of a shrine a very old tree with a sacred rope around it. People believe that a god is embodied by a big old tree. Every year in spring or early summer Japanese people hold an opening ceremony for a mountain and wish for safety at sea, and before construction work they usually hold a ground-breaking ceremony in order to calm the god of a piece of land. They also hold ceremonies to give thanks to animals and plants that they are eating, saying the expression of gratitude "*Itadakimasu* (Let's eat!)" before meals and "*Gochisosama* (Thanks for the nice meal!)" after meals. Moreover, people also give thanks to laboratory animals used to study medicine and bioscience. Every year, in every university in Japan with a faculty of medicine, a memorial service is held for the laboratory animals: the ceremony extends to the night of the full moon nearest the autumn equinox. People often even thank artifacts; for example, people sometimes thank old dolls, mirrors, needles, and knives.

Considering these examples, it may be said that the present Japanese idea of nature is, at least partly, influenced by that of ancient Japanese myths in which everything has a life and soul; that is, the idea of animism, although more and more Japanese people accept a modern scientific way of thinking. By holding these ceremonies, consciously or unconsciously, people are expressing their respect for gods and nature. As is well known, Japanese people have experienced innumerable disasters such as earthquakes, typhoons, eruptions, floods, landslides, droughts, and plagues. However, they have also enjoyed beautiful scenery and rich produce from sea and land. Gods and nature are regarded as not only bringing about blessings but also causing misfortunes and disasters for humans. One of the main reasons for holding these ceremonies and visiting shrines or temples is to prevent misfortunes and calamities caused by the gods and to live a happy life.

The Criterion of the Hierarchy of Nature: Ontological and Epistemological Aspects

Ancient Japanese myths, written mainly in *Kojiki* (the oldest book of Japanese myths, published in 712) and *Nihonshoki* (published in 720), tell us about the characteristics of nature that people identified through their daily and religious lives. According to these books, nature, including human beings, is produced by gods and deities. The producing power or fundamental producing power ("*Musuhi*"), which is the basis of the universe, is described in *Kojiki* using two names of gods "Takami-musuhi-no-kami" (responsible for the production and formation of the heavenly world), and "Kami-musuhi-no-kami" (responsible for the production and formation of the earthly world).

These books also tell us about the hierarchy of nature. To be higher in the hierarchy of nature, something needs to possess spiritual power, which is the same as the producing power that ancient Japanese people usually felt or, more correctly, were forced to feel in their mind and body.[1] We cannot but be moved by spiritual power. Ancient Japanese people felt this power as the basis of their lives and nature more strongly than we do now.

As the criterion for the hierarchy of nature, spiritual power has two aspects. One is the basic power of producing the world: that is, producing power. Ancient Japanese people were forced to feel or think that all the things in the universe have a spiritual power as their basis. The other aspect is the power that natural things (including plants, animals, and humans) or even artifacts reveal to conscious beings such as gods and human beings.

Spiritual power as a producing power has an order of development; first, the producing power or life itself, second, land, and then ecosystems and plants. This constitutes the hierarchy of nature. Their spiritual power is producing power. Animals and humans grow from the land or from an ecosystem.

The power that natural things and artifacts reveal is the power that we humans or gods inevitably perceive and feel. Conscious beings know the existence of the beings with spiritual power by perceiving or feeling it. A typical example of this is the power of an ecosystem, such as a mountain, forest, sea, or river, or the power of a big animal,

such as a bear, wild boar, deer, or serpent. We know the spiritual power that beings "have" by perceiving what they "show" or "reveal."

The aspect of spiritual power as producing power is, as it were, ontological, and the revealing power is epistemological. For example, the land is ontologically superior to the ecosystem; that is, without the land, ecosystems cannot exist, but the spiritual power that we feel when we facing a piece of land is less than that we feel, for example, in a mountain, forest, or river. Ecosystems appear to us as a living environment: we not only live in them and receive the benefit from the environment, but we also feel violent power within ecosystems such as earthquakes, typhoons, and landslides; therefore, their situation has a considerable impact on us.

The books of old Japanese myths begin by stating the ontological aspect of the spiritual power, then its epistemological aspect, where conscious beings such as gods, goddesses, and human beings, cannot but feel the impact of spiritual power (desirable or undesirable) in their lives.

Genealogy of gods and goddesses: the Ontological aspect

Japanese myths say there are eight million "*kami*" (deities: gods and goddesses). Japanese *kami* develop in all directions, just like the process of bio-diversity.

According to *Kojiki*, the genealogy of gods is as follows: first, the central god (Ameno-minaka-nushi-no kami, who is central but not active) appeared, then two gods of production (Takami-musuhi-no-kami, and Kami-musuhi-no-kami) appeared, then the gods of the elements of heaven, land, organisms, consciousness, and Izanaki-no-mikoto (male), and Izanami-no-mikoto (female) appeared. Up to this point, gods appeared, but were not born. After Izanaki and Izanami got married, Izanami gave birth to many gods and goddesses, such as those of land, sea, rivers, fields, mountains, valleys, fog, stones, houses, ships, cereals, and fire. When she bore a god of fire, she was burnt and went to the underworld (Yomi): that is, she died. Izanaki, her husband, visited the underworld to take her back, but, breaking the taboo, after seeing the hair-raising decaying body of Izanami, he ran away from the underworld. As soon as he reached the earthly world, he purified himself in a river. At that time, many new gods and goddesses appeared from Izanaki's purifying act. Among them were three noble gods, Amaterasu-oh-mikami (the sun goddess), Tsukuyomi-no-mikoto (the moon god), and Susanowo-no-mikoto (the god of violence), who were born when Izanaki

washed his left eye, right eye, and nose respectively. Amaterasu later became the ruler of the heavenly world (Takamagahara). Susanowo did not rule the sea that was entrusted to him, as a result of which the world fell into a disastrous situation. He went to the heavenly world to see his sister Amaterasu. But after he acted violently and killed a shrine maiden by accident, Amaterasu got angry and hid herself in a cave, causing a disaster for the world. Susanowo was punished and banished from the heavenly world. Later, he defeated an eight-headed serpent to save a young girl (goddess), and then he got married to her and settled in the underworld. The earthly world was governed by the earthly gods, but Amaterasu sent the brave god (Ninigi-no-mikoto) to the earthly world to govern it by force. He is the ancestor of the Japanese emperors. This genealogy, as described, roughly delineates the ontological aspect of spiritual power.[2]

There is no description of the genealogy of human beings (called "green grasses") and animals in *Kojiki*. Suddenly we are told that human beings and animals existed on the earthly land. We can only guess that they grew on land like grass.

The first appearance of human beings is as follows: When Izanaki escaped from the troops of the underworld and pulled the tremendous rock and closed the pass to the underworld, her dead wife Izanami said, "O my beloved husband, if you do thus, I will each day strangle to death one thousand of the populace of your country." Then Izanaki replied, "O my beloved spouse, if you do thus, I will each day build one thousand five hundred parturition huts.[3]" As is stated at the note of the translation, the word "populace" is literally "human grass."

Spiritual Power Ecosystems, Animals and Plants Show: the Epistemological Aspect

In *Kojik*i, there are many places where ecosystems are regarded as gods or deities, and demonstrating their innate spiritual power.

In the following passage, we see the deities of mountains and the spiritual power of the artifact, such as the sword. One of the typical animals that symbolizes strong spiritual power is a bear, especially a large bear.

"When Kamu-yamato-iware-biko-no-mikoto [later the first emperor Jinmu] journeyed from that place and arrived in the village of Kumano, a large bear [could be seen] moving around; then it disappeared. Then he suddenly felt faint; his troops also felt faint and lay down. At this time, [a person called] Taka-kurazi of Kumano came bringing a sword [used during the conquest of the earthly world] to the place where the child of the heavenly deities was lying. As he presented it, the child of the heavenly deities woke up and rose, saying: "Ah, what a long time I have slept!" At the very time that he received that sword, all of the unruly deities in the Kumano mountains were themselves cut down; and the troops, who had been lying in a faint, all woke up and rose." [4]

When Yamato-takeru-no-mikoto was sent to subdue the east of Japan, he advanced, conquering the gods of mountains, rivers, and channels.

From the two passages below, we see many gods of ecosystems, such as mountains, rivers, mountain passes, and gods of animals, such as deer, wild boar, and a plant (*piru*).

"From there, he [Yamato-takeru-no-mikoto] proceeded and subdued all of the unruly Emisi [men from the northern area] and pacified the unruly deities of the mountains and rivers. Then, on his way back to the capital, he arrived at the foot of the pass of Asigara, and just as he was eating his travel rations, the deity of the pass, assuming the form of a white deer, came and stood there. Then he took a piece of *piru* [like onion or garlic] left over from his meal and struck the deer. It hit the deer's eye and killed him." [5]

"At this time, he [Yamato-takeru-no-mikoto] said: "I will take the deity of this mountain with my bare hands." He went up the mountain. On the mountain, he met a white boar the size of a cow. Thereupon he spoke out and said: "This is the deity's messenger, which is here transformed into a white bore. I will not kill it now, but will kill it when I come back." He went up. At this time, the deity of the mountain caused a violent hail storm and dazed him. It was not the deity's messenger, but the deity himself. Before long, he died." [6]

We see many scenes where a mountain or river shows its spiritual power, but the scene of a plant showing its spiritual power is quite rare. One such scene is cited above, where a *piru* thrown by Yamato-takeru-no-mikoto shows its spiritual power and kills a deer.

Another example can be found in the story described above, where Izanami died from burn injuries after giving birth to the god of fire. Her husband Izanaki visited Izanami in the land of Yomi [the underworld], but he fled from Yomi after seeing the decaying body of his wife. Izanami ordered her troops to pursue him.

"The pursuit continued, and when Izanaki had arrived at the foot of the pass of Yomotu-hirasaka, he took three peaches which were there and, waiting for his pursuers, attacked them with the peaches. They all turned and fled."[7]

There is a Chinese myth at the root of the story about the mystical power of peaches. Here, the peaches demonstrated their spiritual power they were supposed to have.

In the following passage, many plants are used in the ritual of luring out Amaterasu, who concealed herself after the violence of her brother Susanowo. These plants show their spiritual power against the background of the power of gods and the strong spiritual power of the sacred mountain Ame-no-kagu-yama.

"They [gods in the heavenly world] summoned Ame-no-ko-yane-no-mikoto and Puto-tama-no-mikoto to remove the whole shoulder-bone of a male deer of the mountain of Ame-no-kagu-yama, and take heavenly *paraka* wood from that mountain, and [with these] performed a divination. They uprooted by the very roots the flourishing *ma-sakaki* trees of that mountain; to the upper branches they affixed long strings of myriad *maga-tama* beads; in the middle branches they hung a large-dimensioned mirror; in the lower branches they suspended white *nikite* cloth and blue *nikite* cloth. Puto-tama-no-mikoto held these various objects in his hands as solemn offerings, and Ame-no-ko-yane-no-mikoto intoned a solemn liturgy."[8]

When do plants show their power?

Here, I want to summarize the situations in which plants show their spiritual power.

1) An ecosystem such as a mountain, a forest, or a valley demonstrates spiritual power by itself, but one tree, separated from a mountain or forest, rarely shows its spiritual power. Even now in a forest we can experience some feeling of a healing mixed with a sense of awe. But we do not have such a feeling when facing a single plant. In *Kojiki*, although there is the description of the god of *cereals* (plants), plants rarely show their spiritual power to us. That is, ontologically, plants have more spiritual (producing) power than animals, but, epistemologically, they show less spiritual power than animals. If a tree that is neither very big nor very old reveals its spiritual power to us, it is usually in the context of a mountain or river (ecosystem). Even without the context of an ecosystem, a plant can show its spiritual power in a sacred place (shrine).

2) If a god or goddess wishes to give power to a plant, it can show the power that it already has. For instance, the peaches thrown to beat back the troops of Yomi, and the *piru* thrown to a deer, who was the deity of a mountain pass, causing the death of that deer.

3) Even without the context of a forest, a sacred place, or the power of a god, a giant tree or a very old tree often shows its spiritual power to us and we may be struck with awe. We feel, as it were, that we are facing a god. That is, a giant tree, like a god, shows the spiritual power that it ontologically has.

4) The statement above, that ordinary single plants do not normally show their power, holds true of the cases where the world is in good order, i.e., in an ordinary situation. However, when the world is in extreme disorder, plants that are not large or impressive may show their spiritual power independent of the spiritual power of ecosystems or gods.

For example, in the earthly world, before it was ruled by the earthly order-forming gods (Ohkuninushi-no-mikoto [a descendent of Susanowo] and Sukunahikona-no-mikoto [child of Kami-musuhi-no-kami]), the grass and trees had speech and scared people.

In *Nihonsyoki* (published in 720), after the earthly land had been formed, reflecting upon what it was like before, Ohkuninushi says,

"The earthly world was a desolate land, where every rock, grass and tree acted violently and scared men."[9]

Moreover, from the viewpoint of heavenly gods and goddesses, the earthly world was not in order, even after the earthly gods calmed it down:

"There were many gods in that land that shined bright like fireflies, and evil gods that buzzed noisily like flies, and more, the grass and trees spoke."[10]

World of Disorder and Disastrous Situation

We can regard the world as in extreme disorder when a disaster occurs. The sentences below show the close relationships between disorder and disasters.

"While the other deities ruled their realms in obedience to the commands entrusted to them, Susanowo-no-mikoto did not rule the land entrusted to him. Instead, he wept and howled, even until his beard became eight hands long and extended down over his chest. His weeping was such that it caused verdant mountains to wither and all the rivers and seas to dry up. At this, the cries of malevolent deities were everywhere abundant like summer flies; and all sorts of calamities arose in all things."[11]

A similar situation occurred when Amaterasu (the Sun goddess), afraid of the violence of Susanowo, hid herself in a cave, neglecting her duty to govern the worlds.

"At this time, Amaterasu, seeing this, was afraid, and opening the door to the heavenly rock-cave, went in and shut herself inside. Then the heavenly world was

completely dark, and the earthly world was entirely dark. Because of this, constant night reigned, and the cries of the myriad deities were everywhere abundant, like summer flies; and all manner of calamities arose."[12]

In old Japanese myths, producing power or spiritual power is, as it were, life itself, and it can be good or bad for humans. Producing power and destroying power are the two sides of one coin. The power transcends a human viewpoint and human values. The role of the gods is to give order to both the heavenly world and the earthly world. If the world enters a state of disorder—that is, the negative aspect of the producing power becomes seriously active—disasters will occur.

In a situation of a disaster, we feel strongly the negative spiritual power of the ecosystem or the land. Ecosystems and the land appear in a quite different way from in ordinary situations. Instead of being stable, the land shakes and slides, and instead of supplying food, the sea attacks us with a tsunami, and ecosystems lose their peacefulness. Usually ecosystems and lands nurture human beings, but in a disaster they attack us: the hierarchy of nature collapses.

This serious disorder is described metaphorically as the speech of the grass and trees. This is an animistic interpretation of a natural disaster.

What all the ancient people could do in the face of disasters was to do their best; evacuate the land where disasters occurred, send relief to the victims, work to repair the damage, and pray to the gods to become calm or do their duty. Furthermore, they could check and improve the order of the political world.[3]

Applicability to Environmental Ethics

Through this consideration, we can observe the applicability of the idea of the spiritual power to environmental ethics. Spiritual power appears to us in either a positive manner or a negative manner. The typical negative appearance of spiritual power is a disaster. Positive spiritual power appears when the relationships between men and nature remain good.

Aldo Leopold declared that, "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.[4]"

These sentences are often cited as proposing a “land ethic;” however, the concepts of “integrity,” “stability” and “beauty” are not clear. For example, Kristin Shrader-Frechette, after criticizing the view that an ecological theory can be judged on the basis of its ability to predict, stating “At the other extreme of the proposed ecological foundations for environmental philosophy, concepts such as ‘integrity’ demand too little of ecology because they are qualitative, unclear, and vague.”[5] The same criticism applies to the concepts “balance of nature,” “equilibrium,” and “stability.”

The ambiguous terms “integrity, stability, and beauty,” and also “balance,” “equilibrium,” and “health of an ecosystem” can be regarded as the positive presentation of spiritual power.

It may sound as if there is a leap in logic in what I stated above. However, when we consider the thought of Banzan Kumazawa (1619–1691), a famous Confucian in the early Edo period who adopted Shinto elements positively into his thought, this argument seems relevant. He made an effort to prevent disasters for the sake of maintaining good relationships between men and nature.

“In China they say ‘When the Wei River and Luoyang dried up, Xia dynasty fell’. ・・・・・The Wei River and Luoyang drying up means: as the plants on the upstream mountains are cut down, the spiritual power (*Shen qi*, the power of the deity) of the mountains became weak, and the current of the rivers decreased. Consequently, sand piled up on the river when it rains heavily, and at last a landslide occurred, resulting in the disappearance of the river. Recently we hear of mountain slides in many regions, the process of which is similar to this.[6]”

Here, the term “spiritual power” of mountains is crucial, because it plays the role of a touchstone of whether or not an ecosystem (in this passage, a mountain) is sound. If that power is strong—according to the idea of this paper, if that power is positive—the ecosystem will be sound and healthy.

It should be noted that nature brings about blessings but also causes disasters for humans. Our attitude toward nature has to take the both sides into consideration. Either an “anthropocentric” attitude of ruling and managing attitude, or a “non-anthropocentric” attitude of conserving and respecting, would be one-sided.

Border transgression between humans and plants

The speech of the grass and trees can be thought of as a border transgression between humans and plants, and it typically occurs in a disaster. This is the transgression of the plants (or lands, or gods) to humans. Disasters are, as it were, the lands and plants invading the everyday lives of human beings.

In *Kojiki*, there are descriptions of mediums who hear the voice of gods. Here, the transgression is from gods to humans. Therefore, is it impossible to transgress the boundary from humans to plants or land? I think it is possible.

Collectively speaking, after the occurrence of a disaster, and, individually, when we fall seriously ill, we often feel depressed. In such a situation, we feel that life and death are not separated and we eagerly want to return to the ordinary life. It may be said that in such a situation we transgress, at least half a step, the boundary between humans to plants or lands. That is, through a disaster or a serious illness, plants or lands transgress the boundary to humans, and we humans fall into a depressed situation: that is, we are forced to transgress to the field of plants and lands. We, as it were, involuntarily transgress this boundary. In ancient times, on the final day of June and December, and especially after a big disaster, the government held a special ceremony of purifying ourselves to get rid of the depressed feeling; gods carry our dirtiness to the depths of the sea, then it is blown off to the underworld, and finally a goddess in the underworld carries it away. Moreover, seasonal festivals will encourage us to return to everyday life. These are voluntary transgressions. The cycle of "everyday life," "disaster or illness," "depression," "ceremony or festival," and "everyday life" again is the cycle between the ordinary and extraordinary situations. It also demonstrates the cyclic transgression between humans and plants or lands.

The term "depression" seems to refer to a psychological element in the cycle. However, the cycle itself is cosmological rather than psychological; as is shown in the dirtiness-dispelling ceremony, depression caused by a disaster or serious illness is relieved by asking the gods to dispel it to the underworld.

We can find another kind of transgression in *Nihonryouiki*, a book of mysterious stories written from a Buddhist viewpoint in around 820.

In one of several stories in *Nihonryouiki* where a tree speaks, no one but a Buddhist priest hears the voice of a pear tree saying, "Please don't step strongly." The cut tree

was used as a bridge over a brook. After looking at it closely, he found that someone had tried to make a statue of Buddha out of it but abandoned the work. He got angry, cried, and worshiped it, then he carved statues of Buddha and Bodhisattva in it.[7]

In the story, it is said, "A tree does not have a mind, so why did it speak? Because the soul of Buddha showed itself through the speech."[8]

In Japanese Buddhism, applicability of the concept of Buddha-nature (*Bussho*) to beings other than humans was one of the main points of dispute. If a being has Buddha-nature, it has the possibility of becoming a Buddha. According to the understanding of Buddhism in *Nihon-Ryouiki*, plants have no mind, but they can become a Buddha by the soul of Buddha. That is, a tree that has no sense can become a Buddha, because the thought of Buddhism can convert the world to the world of Buddha, where everything becomes a Buddha. Therefore, in *Nihon-Ryouiki*, only a Buddhist priest can transgress the boundary between humans and plants by way of the thought of Buddhism. In *Nihonsyoki*, plants speak in a world of extreme disorder, and in *Nihon-Ryouiki*, a plant's voice is heard by a priest living outside of the everyday life.

In these two cases, the transgression occurs in a different direction. The reason for this difference is that the hierarchy of nature in old Japanese myths depends on spiritual power giving life to humans; on the other hand, in Buddhism, the hierarchy is from humans (as realized persons) to animals, plants, and ecosystems.

Endnote

1 In this article, "spiritual power" has the same meaning as "producing power." Both are the same as the power that living things, including nature, gods, and human beings, have. It is said we depend upon spiritual power both ontologically and epistemologically. It is at the basis of the nature of gods and human beings. We cannot but feel it and are always moved by it. In other words, all lives have the characteristics of uncontrollability: we can only partially control a life, including our own. Spiritual power or producing power is the power of producing and order-formation; however, it is also the power of destruction. Production and destruction are two sides of the same coin.

2 It may seem curious that gods of artifacts such as houses and ships are included here without describing the genealogy of human beings. If we regard these houses and ships as made by gods, we can understand the phrase without contradiction.

3 *Kojiki*, translated by D.L. Philippi, Univ. of Tokyo Press1968, p.66.

4 *Kojiki*, p.167 (slightly revised).

5 *Kojiki*, p.242 (slightly revised).

6 *Kojiki*, p.246 (slightly revised).

7 *Kojiki*, p.65 (slightly revised).

8 *Kojiki*, pp.82–83 (slightly revised).

9 *Nihonsyoki*, vol.1, chap.8.

10 *Nihonshoki*, vol.2, chap.9.

11 *Kojiki*, p.72 (slightly revised).

12 *Kojiki*, p.81 (slightly revised).

13 This Chinese thought about the correlation between heaven and earth was introduced in ancient times. According to that thought, misgovernment is regarded as a cause of a disaster, and every disaster includes a man-made element. However, a god neglecting his or her duty as the cause of a disaster, as stated in this paper, seems to be a primitive and fundamental thought.

14 Aldo Leopold, *A Sand County Almanac and Sketches Here and There*, (Oxford: Oxford University Press, 1949), 224–225

15 Kristin Schrader-Frechette, "Ecology" in *A Companion to Environmental Philosophy*, D. Jamieson (ed.), (Blackwell, 2001), p.306.

16 Banzan Kumazawa, *Shugigaisyo*, in *Nakae Toju & Kumazawa Banzan, Japanese Classic Book Series*, vol.11, (Chuo Koronsya, 1983), p.399.

17 *Nihonryouiki*, vol.2, no.26. Another example of a tree speaking is also about a statue of Buddha made of wood. (vol.2, no.39). Two half-done clay statues of Buddha speak painfully and ask to be completed in vol.3 no.17.

18 *Nihonryouiki*, vol.2, no.26

Takao TAKAHASHI

(PhD, Emeritus Professor, Kumamoto University, Japan)

ttaka@kumamoto-u.ac.jp

LIFE AS IMPLEMENTATION:

APPLICABILITY OF ONTOLOGIES BY ERNST BLOCH AND NIKOLAI BERDYAEV

Tatiana Yu. BYSTROVA (Ekaterinburg/Russia)

Beauty is the "sublimity of that
which carries with itthe presentiment of our future freedom". E. Bloch.

"A man should pass from the religiously passive and receptive state to the state that is religiously active and creative." N. A. Berdyaev

The article compares the views on the destiny of a man expressed by E. Bloch, a German philosopher, the author of the "principle of hope", and N. A. Berdyaev, a Russian religious philosopher. The paper shows the dependence of philosophical approaches on life circumstances and the relation of such approaches to the ideas of Aristotle. The article identifies some general points of interpreting life as implementation, which are relevant to contemporary cultural situation.

Introduction

There are a few major scientists in the philosophical science of the 20th century, whose views became to be interpreted in the conventional way. In the new socio-cultural context of the 21st century there is a chance to rediscover the productive ideas of a number of precursors, in particular, the ideas of Ernst Bloch, a German philosopher (1885–1977) and of Nikolai Alexandrovich Berdyaev (1874–1948). Their ontological ideas regarding place and objectives of a man in the world possess some common features, and clearly bear the mark of differently perceived Aristotle's principles, though the interpreters of these ideas rarely relate them to Aristotle. There are also lexical similarities: for example, life is understood as a creative process, which cannot be imagined without freedom. In return, future is impossible without active human efforts and creativity.

Since both authors left a considerable philosophical heritage, we shall mainly refer to the original sources, almost without reference to the commenting literature, and shall use a *comparative morphological* method.

We call it morphological, since we are talking about simulating and comparing certain models of the world. A man itself and the human existence cannot be studied as detached from the world in which a man lives. In addition, both N. A. Berdyaev, and E. Bloch give a number of ontological features of this "world", which allow to narrow the ideas to a certain cosmological model, "inside" where a man is engaged in self-realization.

Here we select only those works and ideas that are related to the field of philosophical anthropology. The article does not take into consideration either any political or, in case with N.A. Berdyaev, religious papers.

Let us mention the works of the authors, who had studied the anthropological ideas of N. A. Berdyaev in a most vigorous way. First of all, this is V. . Zenkovsky, a representative of the "second wave" of emigrants from Russia in the 20th century, the author of fundamental work on the history of Russian philosophy. Next, we should also mention P. P. Gaidenko [14], A. A. Ermichev [13], Yu. Cherniy [12], O. D. Volkogonova [19], S. Reichelt [16], and R. Schein.

Philosophical and anthropological ideas by Ernst Bloch are studied by E. Bahr [1], J.R. Bloch, K. Bloch [9], I. Boldyrev [10], E. Braun, M. Buhr, A. Czaika [22], R. Damus, B. Dietschy, T. Fahrenbach, T. Franz, H. Gekle, E. Krieger, B. Schmidt, S. Werschinin [18], P. Widmer, P. Zudeick [21] and others.

The concepts of the chosen authors, also in connection with the influence of Aristotelian philosophy, have not been compared so far despite the fact that these concepts are historically and spiritually "close".

The article consists of three parts.

1. Influence of living circumstances on the philosophical ideas about a man

2. A man in the philosophy of creativity by N. A. Berdyaev

3. A man within the principle of hope by E. Bloch.

Finally, we singled out some general ontological and axiological and ideological issues in how the mentioned authors interpret life as implementation.

Discussion

1. Influence of the living circumstances on the philosophical ideas about a man

Both philosophers lived difficult lives, full of hardships and losses. They were persecuted by different political regimes (for instance, E. Bloch was expelled from the socialist GDR, and he was not completely accepted in the University of Tübingen). Of course, this kind of "being on thin ice" influenced their manner of philosophizing and content of philosophical reflections. Therefore, first of all, it is necessary to briefly describe the creative ways of those two scholars.

1.1. Nikolai Alexandrovich Berdyaev is a Russian religious philosopher of the Silver Age. He was born in a family of a military man, and after school entered Kiev University, from which he was expelled for his aspirations for freedom. Although he did not have a completed higher education, he was one of the most educated and intelligent writers of his time. This is due to the fact that during his exile in Tula, N. A. Berdyaev was one of the youngest representatives of the revolutionary movement. He was surrounded by highly educated people, the representatives of different political trends[223]. In this sense, his education was much superior to a university education in the humanities in Russia of those times. At the same time his education was quite an eclectic one: N. Berdyaev moved from Marxism to transcendental idealism, and later to religious philosophy, eventually creating his own philosophy of creativity, a bright and original one. N. Berdyaev was not an orthodox in any of the philosophical areas he studied. Instead, he searched them for methodological and ideological provisions that later made up the basis for his own doctrine, the first to gain recognition in the western countries (although more than 150 people representing the intellectual elite of

[223] "A. A. Bogdanov, a well-known Marxist theoretician, A. Lunacharsky, a would-be People's Commissar of Education and an art theorist, B. Savinkov, a socialist-revolutionary and an author of the book "Pale horse" that hadn't been then written yet, A. Remizov, who decided to devote his life to literature exactly during this exile, and many others served their exile in Vologda province together with N. Berdyaev. A distant relative of N. Berdyaev was a Governor of Vologda at that time, and that fact somehow put N. Berdyaev in a privileged position, although he considered it unacceptable to enjoy any privileges and preferences as compared with other exiles" [19].

the country were removed from the country together with N. Berdyaev on board of one of famous "Philosophers' Ships").

"I had to live in an era that was disastrous both for my country and for the entire world. The whole worlds collapsed in front of my eyes and the new worlds appeared in their places. ... I witnessed how people were being transformed, adapted and changed, and this may have been the most difficult thing in my life. ... The epochs, which are so overwhelmed with events and changes, are deemed to be interesting and significant, but for certain people and for the whole generations these same epochs are also unhappy and full of suffering. History neither spares the human personality, nor even takes notice of it. ... I still do not know what the world shock will end with. I've experienced too much for the philosopher: I was in prison four times – twice under the old regime, and twice under the new one, served a three-year exile in the north, was tried and threatened with permanent exile in Siberia, was expelled from my homeland, and probably will end my life in exile,"– writes N. A. Berdyaev in the decline of his years [4. P. 9]

"The Meaning of Creativity: A Justification of Man," one of the philosopher's fundamental works, was published in Moscow during the First World War. It was the last work published by N. A. Berdyaev in his native country. After the October Revolution of 1917 the philosopher, as well as almost all of bright scholars of the pre-revolutionary era, was forced to leave Russia. Since 1925 he lived in France (being almost perpetually in want, in spite of his international fame), taught in Russian religious and philosophical academy in Paris, and died in the town of Clamart in 1948.

His contemporaries consider him to be an excellent speaker. This partly explains his style of writing, which was not quite traditional, being close to journalistic or preaching genre, with many repetitions, some logical failures, and the spirit of moralizing. Nevertheless, these works have been very attractive because of it is clear that they were written by a bright and strong personality. Berdyaev himself writes in his "Autobiography": "My thinking is intuitive and aphoristic; there is no discursive development of thought in it. I can not develop or prove anything fully" [20. P. 718]. "I was interested in ... shouting to the world what my inner voice will discover me as truth," – he admits.

Philosophically, Berdyaev's personality was established as a result of synthesis, and rethinking of many philosophical ideas. V.V. Zenkovsky, a major Russian philosophy researcher, writes: "N. Berdyaev's creative activity was mostly influenced

by the works of such Russian scholars as Vladimir Solovyov, Victor Nesmelov, Vasily Rozanov, and Dmitry Merezhkovsky, but the influence of Fyodor Dostoevsky, as mentioned by Berdyaev himself, was no less strong. As for the foreign writers, these were Schopenhauer, Nietzsche, and Boehme who influenced Berdiaev most of all" [20, P. 62).

Personalism may be considered the main feature of the N.A. Berdyaev's philosophical approach to the issue of a man. Most Russian philosophers of the late 19th and early 20th centuries consider the idea of communality as being the most adequate one to the realities of Russian life (people in the ancestral structure of the Russian village; "we as consciousness"; Me in the dialogue with other people). This concept led the Bolsheviks to the idea of collectivism, and to the idea that the interests of an individual should be subject to social and political circumstances. N. Berdyaev considers a man to be an independent and active individual, who exercises an option. "In our century this type of philosophy was called existential; Berdyaev notes that Russian philosophy is in general mostly existential, and this is particularly true with regard to the 20th century. N. Berdyaev considers himself and his friend Lev Shestov to be real existential philosophers," – a famous Russian researcher P. P. Gaidenko notes [14. P. 6]. In their turn, the ideas expressed by N. A. Berdyaev influenced the establishment of French Existentialism.

The independence of judgements and philosophical schemes primarily results from the philosopher's self-understanding, and self-reflection. One episode of the time of Berdyaev's youth from the times of his political exile to Vologda is meant to make an example. On the road the exiles began arguing about whether it is necessary for them to hold out a hand when meeting the chief of police. They wanted to decide on this issue collectively in order to stick to the pattern of behaviour, which would be common for everybody. Although N. Berdyaev considered the subject of the dispute pretty stupid, he insisted that the manner of greeting people is a strictly personal matter, and he would not follow any common requirements in that. Throughout his entire life Berdyaev was, first of all, an individualist in philosophy and morality, while being a revolutionary in his political views.

1.2. The biography of E. Bloch, which has been repeatedly studied by his followers [1; 9; 10; 18; 21] is, first and foremost, a biography of a pathfinder, who is looking for a place for his own self-realization. E. Bloch was also persecuted by

different regimes, as were most scholars of the 20th century, and it was hard for him to adapt himself to hypocritical or routine circumstances.

He was born in 1885 in an industrial German town of Ludwigshafen near Mannheim, a city having long-standing historical traditions. We believe that this inner inconsistency of the beginning of his life (between modernism and history, between industry and art, between pragmatics and philosophy) gave a strong impulse for E. Bloch's spiritual development. As a student, he studied in Munich, where T. Lipps was his teacher, and in Heidelberg, where he got acquainted with Max Weber and György Lukács. E. Bloch considers G. Hegel and Karl May to be the most significant ones among the specific authors [21. P. 27]. He was equally influenced by the Goethe tradition, which, in turn, traces back to the ideas of Aristotle.

N. A. Berdyaev and Ernst Bloch are brought together by the desire to synthesize Christianity and Marxism, especially in the early period of their creativity, as well as by the overall romantic spirit, and by their sincere faith in the possibility of improving the world. E. Bloch wrote *Geist der Utophie*, his first major philosophical work, in 1915–1917, during the Great War. Continuing his education and self-education in Europe of 1920-s, the philosopher strengthened his philosophical views. In 1933 he had to emigrate from Nazi Germany (going to Zurich, Vienna, Paris, Prague, and finally to the United States). The philosopher began working on his largest book *Das Prinzip Hoffnung* during World War II, while living in the United States, where he published books written not only in English but also in his native German. His idea of Vaterland der Zeit – the idea of possibility of a man's spiritual binding not to a certain space, but to their history, spiritual roots, and culture – was being formed at that time. In 1948 E. Bloch was invited to the Department of Philosophy at the University of Leipzig. After some hesitation he accepted the invitation, also because of the fact that the political situation within the United States became worse. However, his staying in the German Democratic Republic was not an easy thing as well. Here, in 1952, E. Bloch wrote *Avicenna and the Aristotelian Left*, the work, which is virtually not mentioned by the commentators.

In the middle of the 1950-s there was a brief period when the philosopher got some acknowledgement on the part of pro-Communist government. However, his love of freedom, his extravagance, and his emotionality did not fit either within the spirit of a German university and within the frame of a society which was turning into a Socialist one. E. Bloch heard the news about the construction of the Berlin Wall in 1961, when he was in Munich. Leaving all things and his collection of books in the

GDR, he decided not to return there. His decision was broadly criticized. However, the last years of his life in the Federal Republic of Germany were active and intense, and brought the philosopher a worldwide recognition.

The analysis of biographies of N. A. Berdyaev and E. Bloch enables us to argue that their understanding of a man is closely associated with a controversial historical period, where the search for metaphysical foundations of the being is shifted from something eternal and permanent onto the procedural and creative element. This by itself brings both authors closer to Aristotelian traditions. The idea of philosophy (and of thinking in general) being involved in all life processes is even more important here. Its beginning lies in Aristotle's fixing an idea as an internal inherent essence of things and processes. If we recall the medieval dispute of the Nominalists and the Realists, we can confidently say that the philosophers, whose views we are analysing, are Realists. They consider actual events and processes as being primary, and do not fit them into abstract and speculative mental structures.

1.3. General tendency of the ideas expressed by N.A. Berdyaev and E. Bloch

The philosophical schemes by E. Bloch are saturated with the spirit of *Utopia*. Cosmologically, Utopia assumes the implementation of historical potential in the mutual motion of human naturalization and nature humanisation.

The Eschatological idea of "*the end of history*" is important for N. A. Berdyaev. This is not the end of the world as the laymen understand it. This is the end of the existence of a man in his obedient and and "captured" state. If a man starts creating, history will rise to a new round. Speaking of human piousness, the philosopher refers to creativity as a religion: "Creativity is a religion by itself. Life should be justified by creativity" [3. P. 329].

2. A man in the philosophy of creativity by N. A. Berdyaev

N. Berdyaev considers a man to be the main force behind the implementation of life as a result of divine creation. The design of God will not be perfectly fulfilled without human efforts, without the creative activity of a man. This provision makes the philosophy by N. A. Berdyaev completely different from the views of the Orthodox religious philosophers.

While the researchers distinguish four stages in the creative activity of N. A. Berdyaev, his views have been consistent: the ethical ideas of the first period do not contradict the personalistic search of the fourth period, especially if we choose to focus on the model of a man in his relationship with the world. We can agree with P. P. Gaidenko, who notes that: "A man ... his freedom, his destiny, meaning and purpose of his existence has always been Berdyaev's main subject of interest" [14. P. 8].

The Russian philosopher understands the world as dual, that is, composed of matter and spirit but, as in the works by Aristotle, they are not separated by an insurmountable barrier (e.g., the concept of cognition as an intuitive-mystical experience is filled with criticism of the "streamlined, rational being"). Human life can and should become the overcoming of the process of "objectification" of a spiritual element, which is "the kingdom of the ordinary", the priority of "obligatory forms of life." In this world, a man is in a state of slavery: matter enslaves him. Besides, the objectification impersonalises a man, because it is anti-personalistic. This state is constantly opposed to "life in freedom", which is achievable through creative acts. Freedom is inherently present in the world, and, according to N. A. Berdyaev, this is what helps to reveal God and human personality.

The ideas about personality do not appear empirically with respect to specific people. A personality is a *spiritual reality*, and the principles of physics are not applicable hereto.

The philosopher interprets the life of a man as a possible transition from the state of *obedience* to the state of *creativity*. He associates the former state with the "arrangement of the world", that is with the arrangement of the objective environment of a man, whereas the latter state is associated with the "ascent out of the world", that is, with the man's overcoming his earthly nature, and with the appearance of a responsible attitude to the destiny of the world. The human spirit is captivated by the material world. However, N. A. Berdyaev argues that human nature is not confined only to materiality, as compared with the ideas of Positivism, which began to gain authority at the turn of the 19th and 20th centuries. A man does not fit within limitations and laws of the material world only.

In his work *The Meaning of Creativity* (1916) N. A. Berdyaev treats a man as a microcosm: "The Universe enters a man, and yields to the creative effort of him as a small universe, a microcosm" [3. P. 295].

The man "initially resides in freedom", but he has been so far (on a scale of the entire historical process) immersed into material existence and practically does not differ from physical natural objects. It takes a man not only beyond his destiny, but beyond morality as well. While the human spirit is captivated by the material world, it is indifferent to the good and does not oppose the evil. Selfishness and ambitious self-immersion, immersion into material interests leads to the "painful disruptiveness" both of a man and of everything in his surrounding environment. A man may stop following dogmas and regulations in the process of self-realization, when becoming a real subject of the historical process, and *guess* that the creative act is both possible and necessary, and create something new, which had not existed before. A man continues the creative act initiated by God implementing the potential that lies within the world. This is the meaning of the justification of a man's existence called anthropodicy, and the Russian philosopher talks constantly about it. "The creative act always implies liberation and overcoming. It is here that an experience of freedom lies within" [3. P. 255]. This act also has an ethical aspect. N. A. Berdyaev writes: "Creativity stands as if it were outside the ethics of law and the ethics of redemptionand presupposes a different kind of morality. The creator is justified by his creative achievement... creative genius is not concerned with salvation or perdition...","creativity means that one's mind passes on to another plane of being".

Creativity – and not just in the art – is the creation of something fundamentally new, something that had not existed before. To fulfil his mission a man should overcome the customary forms of life, which are full of "selfish and narcissistic self-immersion" and lead to the separation of a man from the macrocosm. Speaking of the stages of creativity, N. A. Berdyaev introduces the concept of "negative freedom" in order to show that the abandonment of common forms of material life is the first step towards self-realization. In this aspect the creativity is understood as the act, which is more symbolic rather than real.

In general, the direction of antropodicy is the following: from spontaneous freedom through the captivity with the material "world" ant its denial to the creativity as a process of making something new and self-realization. God expects from a man to be creative, and this creativity should be a kind of revelation, i.e. discovery of the human essence. When creating something, a man once again can come to the objectification of the spiritual element – this is the inconsistency in N.A. Berdyaev's view.

3. A man within the principle of hope by E. Bloch

The Utopian philosophy by E. Bloch is also saturated with the idea of self-fulfilment, self-realization of a man. We shall concentrate on that idea leaving aside numerous and controversial polemic political ideas by E. Bloch.

E. Bloch seeks to overcome the gap which had probably been existing since the times of Plato, the long-lasting gap between the theoretical knowledge and the real world, the disruption of a man into the "knowing" and the "living" halves, a kind of alienation of philosophy from the world and life. That is why he leads the reader to a very specific philosophy, the *onto-logic*, as he calls it.

What is it? Let us turn for explanation, for example, to Aristotle, who is usually credited with the idea of *panlogism* (V. F. Asmus) as such option of identity between the being and the consciousness, where the thought thing could not but exist and every category is sure to have a real prototype. This category has a logical prototype, and that is why it can exist on its own. In the historical conditions of Aristotle it implies the possibility of reaching harmony between micro- and macrocosm, coalescence and essential unity between them. Let us recall also about Hegel's attempt to create a comprehensive logical system of the world within the dialectical subjective-objective paradigm, where a man can join in the absolute spirit by means of active intellectual effort. E. Bloch is the heir of both things, and he is at the same time a child of his contemporary age, the age, which saw the abysses of social disasters and the depths of human psyche, the ills of alienation, and the hopelessness of technical victories. We can say that Bloch wants to give back to a man his Cosmos, which had been lost on the decline of antiquity, but certainly in its new guise. He seeks to regain their unity: one in another in life and in philosophy (and not one over another, or one against another as an option, or we can say, a pattern), and seeks not just to regain that unity, but also to draw a new path for them. This is a rather unusual kind of utopia, in which the philosopher does not play the role of the "pointing finger" any more, but is a real force acting together with other people. And the philosopher's dialectics is not just a reflection of the global process going dialectically, but a part of it.

According to E. Bloch, a man is material and corporeal. A man begins with "hunger", "absence" and desire to make up for something that is missing. The consciousness does not play the main role here, because the present is so short that it can not be comprehended. A man exists in the "twilight of the moments being lived in"

(Dämmerung des gelebten Augenblicks). The man, as seen by Bloch, lives in the situation of the hindered reflection. The self-comprehension begins through the comprehension of the external world. A man exists not only as Ego, or as Self, but also as "Inside", "Am", "Related to Ego," "Lonely" and even "Home" (Nachhause). The feelings and states of a man are faster and more basic, if not more important, for the existing world.

Hope is the most important of these states. It transforms a man into the "answer" to the "question" posed by the world. If Walter Benjamin, a friend of E. Bloch, saw helplessness, futility and inactivity in hope, the philosopher himself emphasized its practical nature and the correlation with something that is really possible. Hope determines "day dreams" (Tagträume): a man is busy not with processing the past, as Sigmund Freud believes, but with striving to the future – to a much greater extent. Not-Yet-Conscious eventually turns out to be not just a product of pure fantasy, but a psychic representation of Not-Yet-Become in the being. The mission of a man is "a concrete anticipation", a foundation, a revelation of the opportunities offered by the world (literally, in the sense of bringing them to light). This is a kind of "obstetrics" or, in other words, anticipatory illumination of the being, which is pre-senting itself. And at the same time, it is a process of meeting with yourself, filling a kind of void, and creating yourself. The development of a man is the development of the world, and vice versa. Therefore, a man is the sense of the world.

The world is a process of continuous trials and implementation of an infinite number of trends and latentions constituting it. The future is born every second, and every moment bears the responsibility for it. Here there is no division into more and less important trends, or into major and minor ones: it is those trends that revealed themselves that become essential for the being's fates. In turn, only "real" opportunities i.e. the opportunities, which correspond to a given state of the world, become implemented. In this respect the world is a kind of experiment, trial, attempt; it continually boils, and tries to break out of itself. "Anguish" and "passion", "desire" and "incompleteness" are rooted in it. Everything awaits to be discovered, and lives not only in the moment of now, but also in the moment of tomorrow. Hope is the state of the world.

According to the basic premises of the principle of hope, a man starts with a certain existential experience. This experience is defined differently – as sadness, pressure, motivation, desire, etc. What is common for all these features is their procedurality (from inside towards outside, from the individual towards the world,

from emptiness and shortage towards completeness and identity, etc.). In addition, the initial situation is defined in terms of lack of something, for instance, hunger, absence, or shortage. E. Bloch expresses the idea of focusing the attention on the existential experience of the individual and on its fundamental, ontological insufficiency as a specific "For" (Dass) category. The philosopher does not preface the existence with any antecedent substance, but rather tries to define the existence on the basis of the existence itself [18. P. 98].

An artist is a kind of example of a person who lives according to the principle of hope. E. Bloch formulates the model of creative existence in his book Das Prinzip Hoffnung. This model can be described systematically on the basis of selecting and summarising the most significant features.

The 'anticipatory illumination' (Vor-Schein) is a key category describing the relationship between a man and the world in the utopian philosophy. This category refers to the process of Not-Yet-Become turning into Actual, which could be impossible without the involvement of a man. The world is overwhelmed with opportunities that are potentially present within it. What a man is looking for in the world are the things necessary to him, which he does not have yet. This two-direction movement results in the fact that only a few opportunities are implemented, but these opportunities are also the most important ones for a man and the most essential ones for the revelation of the world. The anticipatory illumination (Vor-Schein) is a movement towards *human naturalization and humanization of the world,* towards the identity of the nature and a man, which is the aim of Bloch's utopian daring views.

The art is a kind of this movement, and it is impressive enough for other types of human activity. "Will to art" and "creative anticipatory illumination" are different sides of the same process: in the first case, the emphasis is made on the deduction (recognition, perception) of actual human abilities and aspirations (Trieb), whereas in the second case the emphasis is made on the potencies of the world.

For the first time Bloch began speaking about the anticipatory illumination (Vor-Schein) as the feature of art at the International Congress for the Defence of Culture in June 1935. It was not just an academic discovery. As in previous years, that summer Bloch again had to defend the art of Expressionism from rather dangerous attacks of his old friend G. Lukács, who considered subjective pacifism that was typical for Expressionism to be counter-revolutionary, and those of Klaus Mann, who claimed that Expressionism leads to fascism. Bloch was wise enough to see the

similarity of the statements of his friends with the arguments put forward by Hitler when he spoke out against Expressionism. Bloch says: "... Due to the fact that the truth is not the reflection of facts but of processes; it is ultimately the indication of the tendency and latency of that which has not yet become and needs its activator." [cit. ex: 21. S. 143]. Such an interpretation implies that Expressionism is the art of creating "an awakening high-quality latent language" for this, i.e. the anticipating art (compare with the idea by J. W. Goethe about anticipation).

The book *Das Prinzip Hoffnung* interprets the creative anticipatory illumination as a separate category associated with a special mission, and special human abilities. When reading this detailed work we can single out the following features, which the author failed to describe systematically:

1. This is an actual, real and active anticipatory illumination, as opposed to, for example, the religious one, frequently confronted by E. Bloch to the creative anticipatory illumination. The *religious* anticipatory illumination sees the world "exploding and disappearing apocalyptically" while the creative anticipatory illumination leads to the creation of images (Gestalte), which "do not die, being near the border of their complete implementation." This is explained by the fact that the religious anticipatory illumination relies on the abstract general ideas, and is detached from reality. A religious man in his contemplation of reality does not feel the realities of life, seeing the world as partial and incomplete. Bloch as a voice of specificity and completeness sets the religious anticipatory illumination against the artistic one, which is visible and specific. It goes from reality and is "projected over-world in which What Has Become is reflected". It faces a *daydream,* which is "real at its sound core" and directly related to the life of a man. Therefore, the completion, the result of the religious anticipatory illumination turns into an illusion, a fake, a bad infinity, while the creative "fantasy experiment" of art is of "immanently completed" nature, and it is not illusory.

2. The vector of the future in the anticipatory illumination, and in the creative anticipatory illumination as well, creates a basis for the unity of a man and the world. This unity presents a man as the potential for changing the world, and the reality refers to an unlimited set of possible changes within the varying laws. No one here is opposed to each other as a stranger in front (Fremder gegenueber).

Like any other Vor-Schein'er, the artist should not "stick" to things or "fly" above them. It is necessary to feel the "horizon" of a thing, "real opportunities around it."

Bloch thinks that the artist, who does not treat the world as something utilitarian, is able to do it better than others. The anticipatory illumination is achievable when there is a dialectically open space, in which each object appears as an aesthetic thing, and can develop and reveal its purpose. The non-utilitarian nature of the aesthetic action does not imply the absence of links with the pragmatic human goals. On the contrary, these will be achieved rather easily, because the artist is able to reveal the *latent tendencies* of things, which correspond to the essence of the material to the fullest possible extent. Moreover, it will be done in an individual, specific manner, which would be necessary at a given historical moment: for example, Leonardo da Vinci will do it in his own manner, while for Rembrandt the manner will be different. Bloch is still a consistent dialectician, and the anticipatory illumination (Vor-Schein) of Leonardo, Van Eyck and Jean-Paul will be considered by him not merely as their individual act, but as an individual act of their art form and the world, their age and the world, etc.

The second book of *Das Prinzip Hoffnung* in a very interesting way explores, for example, the ways the Renaissance views of the world and a man were implemented in the works of painters, or rather were formed by them. Treating art in such a way, Bloch postulates and confirms that every creative epoch is unique and original, and finds the origins of these epochs. Welttreue, the loyalty to the world, will be their aesthetic measure.

3. Bloch defines the purpose of the artist through the term Geburtshelfer, "an obstetrician". This kind of obstetrics is not confined to the creation of artistic images, but applies to the philosophy of life, to the way a man acts in general. The artist *creates a foundation* for the world, which is directed towards him. Here he apprehends the "Authentic, or essence" of the world, multiplying the world trends without going beyond them. Bloch defines this "Authentic, or essence" as "which is not yet, which in the core of things drives towards itself, which awaits its genesis in the tendency-latency of processes; ... objective-real – hope". The apprehension of the *Authentic* derives from the unique position of the artist as an aesthetic being capable of forgetting about himself, merging with the world, listening to its intonation and potencies. The artist is simultaneously the nature, and the one who seeks it. In this part Bloch's arguments are very close to Goethe's doctrine of anticipation, and he is well aware of this similarity. However, it's not enough to talk only about the theoretical borrowing, because there are numerous confirmations hereof given by artists, writers, and poets, who describe their attitude towards the world. Goethe is an

exceptional figure of his creative epoch; his ideas, though supported by very few people, are well-known. In the times of Bloch, one hundred years later, the artists themselves come to similar conclusions.

The *obstetrics*, which is represented by the creative anticipatory illumination, can not confine itself to be a purely mental operation. *The aesthetic-utopian sense of beautiful* lies within its "tangible and highly real" character. The total of the deduced opportunities becomes an indicator of how significant a trend is both for the world and for a man. In another place the art is defined as "a laboratory and... a celebration of the deduced opportunities."

The "content-material" art that "apprehends the prospects" for further development is a kind of ideal for Bloch, if it is possible here to speak about the ideal at all.

It is revealing that the philosopher does not contrast the creative Vor-Schein to the scientific or even the practical one. Instead, he thinks that their common objective is the "pure apprehension" of objects and action "in accordance with their nature." If its anticipatory illumination is carried out in accordance with the features mentioned above, there are no limits to that process, because everyone is some kind of an artist.

Critically evaluating the ideas of E. Bloch regarding limits and possibilities of human activity, we can mention the contradiction between the broad features of creative anticipatory illumination, which had been given in theory, and its narrow epistemological interpretation in the specific examples cited in *Das Prinzip Hoffnung*. Although he seems to know all the possibilities and all the infinity of art, Bloch most often does not go beyond his purely informative narrative interpretation, especially when talking about literature and painting. In this aspect E. Bloch's approach is very similar to the Aristotelian idea of art as mimesis.

However, on the next page we come, as if occasionally, across a brilliant analysis of the works of Rembrandt made from the ontological point of view. Analysing this artist's paintings filled with play of light and darkness, overtones and shadows, distinctive lighting of faces and hands, Bloch primarily talks about the Rembrandt's philosophy of relationships between a man and the Cosmos. For him darkness in the paintings embodies an endless and continuous universe, whereas bright spots represent the shining and shimmering future. Wishing to confirm his opinion, E. Bloch analyses not just the plot of Rembrandt's paintings, but also the transformation

of colours and textures in them – and does it within the frame of his theory of Vor-Schein. He notes that the artist never made smooth lighted place as really smooth and flat representing them as spots on the top of paint and ground layers of the paintings. The artist makes them brighter by intensifying the natural work of light. As for the cavities between the peaks of this relief – the essential dark parts of the paintings – the artist fills them with thick brown and blue colours intensifying and thickening the darkness of the depth. The artist depicts both the darkness as an infinite cosmos illuminated by the light of hope, and at the same time the human scene involving fates, characters, and events in the life of the people he loved. Here everything coincides with the model of anticipatory illumination, described in other works by E. Bloch as well.

Art becomes valuable for the philosopher, because in different epochs it anticipated and meaningfully apprehended historical and socio-political trends, and described them. In general, the state of Vor-Schein can be achieved in other practices.

Conclusion

Studying of philosophical ideas of E. Bloch and N. A. Berdyaev is important, because today the problem of the future and the role of a man in achieving it comes to the fore. The trajectories of achieving it directly depend on axiological and world-view dominants, which can be determined by philosophy.

According to E. Bloch, life is the implementation of the principle of hope (das Prinzip Hoffnung), the process of transferring the potential opportunities of being, of "Not-Yet-Become", into its implemented form by means of the active actions of a man. For N. A. Berdyaev, life is a movement towards the personalized freedom that allows a man to move from a state of "obedience" to the state of creativity. It is only on this road where a man can justify his existence and complete the creative act initiated by God. Both of these ontologies, secular and religious, similarly treat life as an implementation of the original human potential by means of experiencing certain states called existences. It is clear that the configurations are different due to the fact that the absolute origin – the God – in present in the specifically religious world-view of N. A. Berdyaev. We are much more interested in the general elements in the interpretation of a man and his attitude towards the world, aiming to identify them in the report.

These elements may include:

– the idea of the interrelation between a man and nature (being) in the process of their mutual movement towards each other. This movement helps the revelation of each party. Such kind of philosophy forms the basis for the concept of sustainable development, which became widespread in the late 20th and early 21st centuries;

– a dynamic interpretation of a man as an active, holistic creature with complex mental organization, in which the corporeal-material and the spiritual components are interdependent;

– the critical rejection of basic attitudes and values of the philosophers' contemporary culture, including political culture;

- the overcoming of the absolute priority given to the cognitive ability as the basic activity of a man;

– the desire to form an original model of a man "in the face of the future".

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Tatiana Yu. BYSTROVA

(Dr. PhD., Professor of the Ural Federal University, Ekaterinburg/Russia)

taby27@yandex.ru

Emergence Theory: A Christianity-Buddhism-Science Trialogue

Wai-han KUNG (Hong Kong/ China)

Introduction

Emergence theory is a metaphysical principle inspired by sciences concerning integrative levels and the complex systems of the natural world. It raises discussions across various scientific disciplines (e.g. molecular biology, evolution biology, neuroscience, etc.) the 19th century. Apart from science, emergence theory provides scientific bases for constructing an organic, creative and teleological cosmology. The concept of emergence also advances many important theories in philosophy, theology, and science-religion dialogue. Such as the process philosophy of Alfred North Whitehead and Charles Hartshorne, Terrence Deacon and C. D. Broad's emergentism in philosophy of mind, the theology of Pierre Teilhard de Chardin, Arthur Peacocke, and Philip Clayton.

Gregory Peterson realizes that "any dialogue between theology and science should be cognizant not only of theological pluralism but of religious pluralism as well" and thus suggests the timeliness of a trialogue among religious traditions on the matters of science, as each works through issues of borders, compatibility, and interpretation.[224] Appropriate to such needs of the religiously plural world, Amos Yong, an Asian American Pentecostal theologian uses emergence theory as a platform to construct a trialogue between Christianity, Buddhism, and science. Yong argues that emergence theory provides resources for us to rethink cosmology and mind-body problem which may open up surprising connections between the idea of emptying (*Śūnyatā*) and interdependently originating/codependent origination *(Pratītyasamutpāda) in* Mahayana Buddhism and the concept of Spirit (*Pnuema*) in Christianity.

However, Yong suggests that the trialogue breaks down when it comes to the theological quest on human becoming in both traditions. It is because the soteriology in term of the union with God in Christianity is absent in Buddhism and the idea of liberation from Saṃsāra is incomprehensible to Christian. I would like to suggest that the Yong may overlook the possibility that emergence theory may also provide a

[224] Gregory Peterson, *Minding God: Theology and Cognitive Sciences* (Minneapolis: Fortress Press, 2003), 13

teleological and eschatological vision about the becoming of human and the cosmos which the trialogue can still carry on if we focus on the understanding of anthropology in Mahāyāna Buddhism with special reference to the Tathāgatagarbha tradition and the idea of deification in Orthodox tradition. More importantly, this may provide a more comprehensive and fruitful trialogue about nature and humanity in Christianity, Buddhism and Science.

Emergence Theory, Biocosmology and Teleology

One of the important claims of the neo-Aristotle approach to biocosmology is for Aristotle, the basic structure of the cosmos is that of a living being, in a sense that the laws of the microcosm, i.e. the laws in biology mimic the laws of the macrocosm. Thus, through observing the laws about the complex system and order of life may give us insight of the laws governing complexity in the cosmos.[225] In general, emergence theory signifies the formation of a system, especially with reference to the biological organization of life, in this regard; emergence theory may provide useful resources for the research of biocosmology.

The term "emergent" was coined by George Henry Lewes, a 19th-century English philosopher of science. He distinguishes the difference between resultants and emergent:

> "Every resultant is either a sum or a difference of the co-operant forces; their sum, when their directions are the same—their difference, when their directions are contrary. Further, every resultant is clearly traceable in its components, because these are homogeneous and commensurable. It is otherwise with emergents, when, instead of adding measurable motion to measurable motion, or things of one kind to other individuals of their kind, there is a co-operation of things of unlike kinds. The emergent is unlike its components insofar as these are incommensurable, and it cannot be reduced to their sum or their difference."[226]

Through his reflection on molecular biology and evolutionary biology, Arthur Peacocke (1924-2006), an eminent physical biochemist argues that nature revealed by

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[225] Georges Chapouthier, "Biocosmology and Biology - Their Fruitful Collaboration", in *BIOCOSMOLOGY-NEO-ARISTOTELISM*, 3 (2) 2003,201-211

[226] George Henry Lewes, *Problems of Life and Mind 2* (London: Trübner, 1985), 412

science is shown to be a structured dynamic system of complex hierarchies. This system is entirely physical: all individual parts in different levels, including human beings are constituted of fundamental physical entities.[227] There are three important aspects to evolutionary emergence, they are: complexity, novelty and whole-part influence.

The complexity of the emergent system is understood in terms of non-reducibility. There is an increasing recognition that phenomena at each level up the sequence of increasing complexity/ order of life: atom—molecule—macro-molecule—subcellular organelle—cell—multicellular organ—whole living organism—a population of organisms—an ecosystem, is causally constituted by the lower level but, once new level having emerged, new properties and laws are governed by distinctive rule and law-like organizations within particular levels. Properties, concepts, and explanations relevant to higher levels cannot be fully explained by, or entirely reduced to those of lower levels in epistemological sense. [228] While lower-level explanations can illuminate observations at the next level in certain degree, only an epistemological reductionist approach will claim itself able to provide an exhaustive account. At the same time, the emergentist hypothesis also recognizes the validity of various scientific discourses at their own levels, without negating the need for higher-level perspectives. Such nonreductive epistemology may lead us to a holistic understanding of the universe.

For novelty, emergence theory not simply present the process in which previously occurring entities are formed but the entities formed are genuinely new. One of the crucial features of an emergent process is it depends on the openness and indeterminism of the complex system. Emergent process is drawn by the interplay of chance and necessity, for example, chance operated in law-like structure in physics produce order at the micro, reductionist level, such interplay of chance and law leads to the emergence of a new and different kind of order at the macro, holistic level of complexity. Such interplay in the process of emergence brings about a natural of openness and creativity which makes room for the self-organization in a hierarchical

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[227] Arthur Peacocke, "God's Presence in and to the World Unveiled by Science", in *In Whom We Live and Move and Have Our Being: Panentheistic Reflections on God's Presence in a Scientific World*, Arthur Peacocke and Clayton, Philip, eds., (Grand Rapids: Wm. B. Eerdmans, 2004), 138-40

[228] Arthur Peacocke, *God and the new Biology* (San Francisco: Harper and Row, 1986), 14

and constructive system.229 There is a tendency for new and distinctive kinds of realities to emerge in which when incorporated into a system, the properties of the parts is constrained in a way which can lead to the emergence of 'unexpected and unpredicted' properties of the system as a whole.230 Since 'emergence' not only describes the present phenomena of the world that 'the way complex systems have evolved in time out of earlier simpler ones through its self-organizing properties'231, but also the future emergence of new structures and functions at higher levels of complexity which is 'an undoubted, observed feature of the evolutionary process, especially of the biological.'232 Davies calls this the dynamic natural creativity as "teleology without teleology"; it is both ordered but open, determinate in its trends but indeterminate in specifics.[233]

Despite their complexity and novelty, emergent phenomena are not totally unique and unfamiliar because they do occur within a continuity of process. This means that the universe as a whole is constituted by the sum of parts, and wholes and parts relate in a way that is both 'bottom-up' and 'top-down', Peacocke describes these two-way causal influence as 'whole-part influence'. The system-as-a-whole is a causal factor in what occurs at the lower level and vice versa.[234] In other words, what occurs at the higher levels is restricted by what is happening at lower levels, and the properties of the whole system have a determinative effect on the lower constituent part. Therefore wholes and parts are dynamically and spatially interrelated.

Philip Clayton, Terrence Deacon, Gregory Peterson suggest that the emphasis of the ontological significance of "form" as causality in emergence theory brings us back

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[229] Paul Davies, "Teleology without Teleology", in *In Whom We Live and Move and Have Our Being : Panentheistic Reflections on God's Presence in a Scientific World*, Philip Clayton, and Arthur Peacocke, eds. (Grand Rapids: Eerdmans, 2004), 105

[230] Arthur Peacocke, "A Naturalistic Christian Faith for the Twenty-First Century: An Essay in Interpretation",12-13.

[231] Arthur Peacocke, "Complexity, Emergence, and Divine Creativity" In *From Complexity to Life, ed. N. H. Gregersen*. (Oxford: Oxford University Press) 190

[232] Peacocke, "Complexity, Emergence, and Divine Creativity", 188

[233] Paul Davies, "Teleology without Teleology", in *In Whom We Live and Move and Have Our Being : Panentheistic Reflections on God's Presence in a Scientific World*, Philip Clayton, and Arthur Peacocke, eds. (Grand Rapids: Eerdmans, 2004), 105

[234] Peacocke, "Complexity, Emergence, and Divine Creativity", 192

to Aristotle. Gregory Peterson suggests, the multiple realizability of information-bearing pattern of emergent entities is reminiscent of Plato's use of mathematical objects to argue for the existence of a separate world of forms. Also, emergence can be regarded as a type of formal causality. The causality of the whole makes room for the Aristotelian notion of "form" as a non-reducible principle of causality that allows us to see complex and dynamic system in the nature. Thus, arguments both for and against Platonic and Aristotelian view of forms have some relevance to emergence theory.[235] A new appreciation of the causality of the whole makes room for the Aristotelian notion of "form" as a non-reducible principle of causality that allows us to see complex entities in the natural world not as mere individual parts, but as unified, organic and dynamic "wholes" yet with their own proper characteristics and activities.[236]

Unlike many evolutionists, Peacocke suggests that naturalistic interpretation of evolution process does not 'preclude the telos', rather the appearance of purpose, or telos, in the universe can be affirmed and naturalized.[237] Peacocke provides argument against the anti-teleological principle suggested by Jacques Monod. Under Peacocke's scheme, telos or evolution as purposive can be understood as the inbuilt propensities and trend in nature. The role of chance in biological evolution can be reconciled with as purposive because "evolution is not operated through pure chance, but the creative interplay of 'chance' and law (or necessity) apparent in the evolution of living matter by natural selection. Peacocke argues that the interplay and consequences of random processes in the law-like framework may imply the *telos* of the world.

Chance operates with this given framework, making it the basis of the inherent creativity of the natural order, enabling, evolving, and generating new forms, patterns, and organizations of matter and energy.[238] The physical fact of 'chance' and randomness in mutation of DNA "does not, in itself, preclude these events from displaying regular trends of manifesting inbuilt propensities at the higher levels of

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[235] Gregory R. Peterson, "Species of Emergence," *Zygon* 41 (2006): 689– 712

[236] Herbert Granger, "Aristotle and the Concept of Supervenience," *Southern Journal of Philosophy* 31 (1993): 166

[237] Peacocke, "A Naturalistic Christian Faith for the Twenty-First Century: An Essay in Interpretation", 17

[238] Arthur Peacocke, *Theology for a Scientific Age: Being and Becoming-Natural, Divine, and Human* (Minneapolis: Fortress, 1993), 122-123

organisms, populations and eco-systems." [239] The evolutionary process is characterized by telos or propensities towards the emergence of systems with increase in complexity, information-processing, consciousness, sensitivity, and self-consciousness.[240] The emergence of more complex wholes from basic parts suggests a directionality that is somehow inbuilt in the natural world. Such tendencies suggest the presence of teleology in the natural world. Borrowing Helen Lang's conclusion on Aristotle's teleology, according to Peacocke's understanding of the emergence cosmology, "there is no difference between the order of nature and teleology of nature."[241]

Pnuema *and Śūnyatā,* ***and Interrelation Cosmology***

It is often assumed that bio-cosmological naturalism affiliates with many Asian religions and philosophies, such as Daoism, Confucianism, Hinduism, and Buddhism, and is incompatible with western thoughts, especially Christianity. Some scholars might suggest that Christianity tends to view or explain the constitution and pattern of the cosmos by an external force, God. Also, Japanese bioethicist Hyakudai Sakamoto contrasts Asian and Euro-American mindset by stating that Euro-American mindset is basically anthropocentric, and inclines to dualistic individualism, whereas Asian thoughts essentially advocate holistic harmony. This is a stereotyped view on Christianity. Through the dialogue with emergence theory, many theologians such as Arthur Peacocke, Philip Clayton and Amos Yong construct a novel way to understand nature in within Christian traditions. Such biocosmological approach in perceiving the natural world may be compatible to both Asian and Western naturalism in certain degree.

Amos Yong, a Pentecostal theologian, who contributes to science-theology dialogue and Buddhist-Christian dialogue, uses emergence theory as a bridging concept to explore the plausibility of the new interpretations of cosmology and human nature in Christianity and Buddhism with special reference to the concept of *Pnuema* (Spirit) in Christianity and *Śūnyatā* (empting) and *Pratītyasamutpāda (interdependent*

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[239] Arthur Peacocke, *Paths from Science Towards God* (Oxford, UK: One World, 2001), 76

[240] Arthur Peacocke, *Theology for a Scientific Age*: *Being and Becoming-Natural, Divine, and Human*

[241] Helen S. Lang, *The Order of Nature in Aristotle's Physics: Place and the Elements* (New York, Cambridge University Press, 1998), 274

originating) in Buddhism in the light of science. He endeavors to find out if and how this approach can illuminate and further Christian-Buddhist dialogue.

In Yong's articulation, he mainly focuses on emergence theory with respect to problem of mind-body relation less on the cosmology. Yong tends to use "neuroscience" or "cognitive science" to identify his articulation on emergence theory. However, we should be very careful that strictly specking the emergence theory is not a scientific theory, even though it is accepted by some scientists. Yong also states clear that the theory of emergence is a philosophical hypothesis rather than a theological or scientific theory.[242]

Borrowing Peacocke's words: 'This interconnectedness of living systems on the surface of the Earth and their interaction with their physical environment can be regarded as one expression of a more general unity and interdependence of all things and events in the cosmos.'[243] Concerning Christyianity, by referring to the idea of "living dust enlivened by the Divine breath", Yong argues that the Spirit of God or the *Pneuma* of God (*Pneuma*, "breath" or "wind" in Greek) provides the creative matrix for the emergence of organisms, including human being in evolution. Hence, all creatures embody the *Pneuma* of God and their existences are sustained and transformed by the same divine breath. From the Pentecostal analogy of Spirit baptism, the "place" of God in the cosmos is best described not as a static location but as a form of movement and process. The activities of the Spirit in the physical universe can be seen as a divine action in order to create and sustain all creation and eventually to return together with that creation to union with God.

He suggests that human being and all other living organisms are radically new systems that emerged from the physical entities. The difference between physical and biological entities lies in there are multidirectional exchange of "information" proceed in biological entities. All levels in the biosphere are interrelationally constituted by the presence of the Spirit of God, the environment can impact individual lives, and individuals can be the agents of change in nature in return. Yong argues that either upward or downward causality is inadequate in describing such "flow" of information.

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[242] Amos Yong, *The Spirit of Creation: Modern Science and Divine Action in the Pentecostal-Charismatic Imagination* (Grand Rapids and Cambridge, UK: William B. Eerdmans Publishing Company, 2011), 145

[243] Peacocke, *Evolution: The Disguised Friend of Faith? Selected Essays* (Philadelphia and London: Templeton Foundation Press, 2004), 41

Lastly, Yong concludes that human being is not isolated individual, but "en-spirited" being that can relate to and interact with other human being as well as the social and natural environment.[244]

Concerning Buddhism, Yong suggests that the notion of Śūnyatā (emptying) in Mahāyāna Buddhism can act as the function category in his Christian-Buddhist dialogue on human nature. He asserts that even though Śūnyatā function in a non-theistic context, its various interpretations given by Buddhists are not as nihilistic as the translation "emptiness" suggests. According to Nagarjuna's *Mulamadhyamakakarikas* (MMK): "We declare that whatever is relational origination is Śūnyatā. It is provisional name for the mutuality for bring and, indeed, it is the middle path"[245], Yong argues that the task of Nagarjuna and the Madhyamaka tradition in Mahāyāna Buddhism is refuting self-existence, but to deny self-existence is not for its own sake, but for the soteriological purpose of recognizing the transitoriness and momentariness of all things on one hand; and the interelationality and interdependence of self on the other.[246] Thus the central idea of Nagarjuna in the Madhyamaka tradition is that the realization of the self-emptying character of all things is to walk the Middle Way between self-existence (i.e. eternalism) and the non-self-existence (i.e. interdependence).

Yong goes further to discuss the idea of Pratītyasamutpāda or interdependent or interrelational origination in the Buddhist understanding of selfhood. Yong aims to argue that the self-emptying self (*Śūnyatā)* is the flip side of the interdependent arising of the self (*Pratītyasamutpāda*). Again, Yong summarizes the idea of Pratītyasamutpāda with the assistance of the theory of emergence in four points. First, Buddhists recognize the intimate connectedness between mind and brain and between brain, mind, emotions and affections. Their authentic self is nothing more or less than the empirical self, hence, the self-emptying nature of human persons is manifest through and realized in the interrelatedness of their embodied and affective self. Second, the authentic self is an intersubjective self, human person is not only an embodied and affective being, but also social, communal, interpersonal being. The

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[244] Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, pp.49-51

[245] Nagarjuna: a translation of his Mulamadhyamakakarika with an introductory essay, Kenneth K. Inada trans. (Tokyo : Hokuseido Press, 1970), 14:18

[246] Amos Yong, *Cosmic Breath: Spirit and Nature in the Christianity-Buddhism-Science Trilogue*, p.132, Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, pp.66-67

notion of human as interpersonal being is revealed by the idea of *karma*. *Karma* means action, work or deed, it can be further classified as individual Karma and collective Karma. Individual karma, then, refers to a specific state of affair that is unique to one person and no one else. Collective karma is composed of a common or collective perception relate to one's family, neighborhood, nation and even the whole planet.

However, under the idea of emergence, there is no individual karma in absolute sense, all individuals are interconnected, and there is no state of affair that only involves one individual existence in the cosmos. Third, the authentic self is the environmental and ecological self. Thus the field of "self" in Buddhism is also the interactive fields of animals, plants, and the generations of persons. Forth, Yong suggests that the complex and the dynamic interraltionality of person, culture and environment bound up together in the field of action, by referring to William S. Waldron, Yong claims that the implications of evolutionary biology is that the vary form and the structure of human life reflect the cumulative results of past activities of innumerable beings over countless generations. Thus human are contingent and historical creature without fixed "nature". [247]

Pneuma and Thatāhatagarbha: Human Being and Becoming

Yong finds that the idea of human becoming in Mahāyāna Buddhism and Christianity is not compatible. First, Yong argues that there are striking differences between Orthodox Christianity and Buddhism when it comes to the discussion on human becoming. It is because the Orthodox goal of deification in term of the union with God is absent in Buddhism; also, the idea of liberation from Saṃsāra is incomprehensible to Christian.[248] *The* Orthodox goal of deification and the Buddhist quest for *Nirvāṇa* are two divergence spiritual paths.[249] In his own words,

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[247] William S. Waldron, "Beyond Nature/Nurture: Buddhism and Biology on Interdependence," *Contemporary Buddhism: An Interdisciplinary Journal* 1:2 (2000):203

[248] Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, 107

[249] Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, 171

"Certainly in the interreligious field, salvation is a peculiarly Christian notion involving deification or *theosis*, the vision of God, or the resurrection into a heavenly existence—none of which Buddhists aspire to attain."[250]

Second, unlike the case of *Pneuma* and *Śūnyatā* in the discussion of cosmology, Yong cannot found one common concept, such as interelationality, as the functional category in doing the comparative study of Christianity and Buddhism in regarding soteriology. I would argue that if Yong is aware of the interpretation of human becoming in Chinese Mahayana Buddhism with special reference to the Tathāgatagarbha thought, he may find some similarities between Christian (the orthodox tradition) and Buddhist (the Tathāgatagarbha tradition) understanding of human being and becoming. The following part is a preliminary attempt to show how the concept of *Pneuma* and *Thatāhatagarbha* may provide a functional concept of "the ontological presuppositions for salvation". Also, the idea of deification and attaining Buddhahood share a common soteriological characteristic as "actualizing the true nature".

Tathāgatagarbha is a key concept of the Tathāgatagarbha tradition, alongside with the Madhyamake and the Yogacare Cittamatra School. Unlike the other two, Tathāgatagarbha tradition does not form any institutionalized school, it other refers to discussion of Buddha-nature with respect to the idea of Tathāgatagarbha, and such idea can be find in any Buddhist traditions, such as Tien-Tai, Hua-Yan and Chan (Zen) school. The Sanskrit word *tathāgatagarbha* is combined by two terms: *tathāgata* and *garbha*. *Tathāgata* itself is also a compound term formed by *Tath* and *āgata* ("thus come"); or *Tathā* and *gata* ("thus gone"). It is an epithet for Buddha, who is "thus gone" in realization from samsāra to nirvana, and "this come" from nirvana to work for the salvation for all beings. The term *garbha* also has two meanings: womb or embryo. Thus *tathāgatagarbha* can be understood as "the embryonic of Tathāgata" or "womb of the Tathāgata".[251]

Tathāgatagarbha thought interprets *Tathāgatagarbha* as a pure heart. However, the idea of pure heart is not a static concept equal to the idea of purity or literally means "the heart is pure". It is a dynamic concept that needs to be understood as the active "purifying power" of the heart. The Tathāgatagarbha tradition advocates the doctrine that all sentient beings, including human beings, are bearer of the embryo of

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[250] Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, 246

[251] Sallie B. King, *Buddha Nature* (New York: The State University of New York Press), 4

Buddhahood and thus possess Buddha-nature that having the potential of becoming Buddha and attain full Buddhahood. There is no ontological different between Buddha and all other sentient being, since Buddha is only the "awakened one" who fully realized and actualized the Buddha-nature. Other sentient beings are Buddha-in-becoming that have not yet realized their inherent potentiality of becoming a Buddha. The idea of Tathāgatagarbha seems to provide an optimistic understanding of human nature that all human nature in its self-nature has the purity of Tathāgatagarbha.

However, in human experience, most of the time human beings are seems to be deluded by *kleśa* or evil. Thus Tathāgatagarbha thought need to explain this paradoxical phenomenon of the possession of both Tathāgatagarbha and kleśa by all sentient beings.

> "The Mind, though pure in its self-nature from the beginning, is accompanied by ignorance. Being defiled by ignorance, a defiled [state of] Mind comes into being. But, though defiled, the Mind itself is eternal and immutable."[252]

Thus in *Awakening of Faith*, "awakening" and "faith" can be interpreted as the realization/awakening of such ignorance of the defiled minds and start to believe that their Minds are pure in its self-nature (i.e. possessing Tathāgatagarbha). The affirmation of the notion of all sentient beings possess Tathāgatagarbha is regarded as "faith", because this assertion of not proven by any empirical observation or objective ground of human experience. Rather it is *a prior* subjective affirmation based on faith.

As suggested by Yong, Holy Spirit is immanent in all human beings and God is active in human domain as the sanctifying Spirit in the process of deification.[253] This notion echoes with the idea of Buddha nature as the transcendental foundation for all sentient beings to become Buddha and all sentient being possesses Buddha nature in Tathāgatagarbha tradition. A Mahāyāna reading on Christian soteriology with reference to Tathāgatagarbha tradition affirms the idea of all human beings are capable of participating fully in the divine energy or becoming Christ in term of the perfection of humanity theoretically. However, one should beware of the dangerous of identifying the Holy Spirit with Buddha nature. Zhang Chunyi (1871-1955) is a Chinese intellectual who identify Holy Spirit with Buddha nature in his "Buddhicizing

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[252] Aśvaghoṣa, *The Awakening of Faith*, Yoshitl S. Hakeda trans. (New York/London: Columbia University Press, 1967), 49-50

[253] Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, 107

Christianity". In their study on Zhang's Buddhist-Christian pneumatology, Lai Pan-chiu and So Yuen-tai rightly point out the problem of regarding Buddha nature *as* Holy Spirit. According to Lai and So, Zhang's theory seems to have a danger of confusing Holy Spirit with human spirit and finally reducing the Holy Spirit to human spirit.[254] Zhang's concept of Buddha nature as Holy Spirit only is analogous to the idea of universal immanence of the Holy Spirit only but not the transcendental aspect of it. In Christian theology, human spirit is creature that different from the uncreated and creating Holy Spirit; there is a sharp distinction between the creator and the creature.

In addition to theological anthropology, the idea of "awakening" in Tathāgatagarbha tradition may provide a new lens in regarding the idea of "baptism with the Holy Spirit" in the Pentecostal tradition. The Pentecostal tradition highly emphases the idea of "baptism with the Holy Spirit", that means the Spirit is "filling', 'falling upon", 'coming upon", or being "poured out upon" the believers.[255] At that moment, a person is regarded as "born again", because that person has the presence (indwelling) of the Holy Spirit. The idea of "baptism with the Holy Spirit" seems to imply that before baptism, Holy Spirit is not indwelling in that person. However, according to Yong, Holy Spirit is omnipresence in all levels of complexity in the world, including human beings, Holy spirit indwells in human in every moment, "without coming and without going". Thus, it seems to be contradictory with the idea of "baptism with the Holy Spirit".

In fact, the idea of "awakening" in Buddhism may provide some insight in solving such apparent contradiction. The idea of "awakening" is not totally absent in Christian tradition, however, unlike Buddhism, it does not have a specific reference. It can be used to descript any realization or acknowledgement of some ultimate truths, such as the love of God, sin, and so on. With reference to Buddhism, "awakening" is specifically point to the realization of Buddha nature intrinsically inherent in all sentient beings; similarly "awakening" can also point to the realization of the intrinsic presence of the Holy Spirit in all creatures in Christianity. In this sense, "baptism with the Holy Spirit" may no longer refer to the "filling" of Holy Spirit of a person, but it

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[254] Lai Pan-chiu and So Yuen-tai, "Zhang Chunyi's Chinese Buddhist-Christian Pneumatology," *Ching Feng* 4(1): 75

[255] Guy P. Duffield and N.M. Van Cleave, *Foundations of Pentecostal Theology* (Los Angeles: L.I.F.E. Bible College, 1983), 309-310

can be interpreted as the Holy Spirit empowers a person to realize that the Holy Spirit is indwelling in s/he.

Towards A Cosmic Soteriology

It is quite obvious that Yong's understanding on Christian soteriology has an anthropocentric tendency. He writes, "The Christian understanding of Spirit's saving and sanctifying work among human being"[256] and "there is a renunciation of all discursively in the saint's engagement with the divine, and the duality between God (in his energies) and humanity id overcome."[257] However, it is reasonable to ask why Yong attributes Christian salvation only to human being? If we only restrict soteriology to the salvation of human, we are actually underplaying the significant of the rest of the universe, all other organisms and even the whole creative work of God. Actually, some church fathers in the Orthodox tradition, such as Gregory of Nyssa and Maximus the Confessor advocate the doctrine of cosmic salvation. This seems to suggest that salvation of non-human realm is not necessary excluded in Christian tradition.

In the Mahāyāna reading of Christian soteriology, the notion of "all sentient beings possess Buddha nature that may attain Buddhahood" and the bodhisattva' vow about the salvation of all sentient beings motivated by compassion in Thatāhatagarbha tradition may suggest that the salvation of God through the work of Spirit is universal in all sentient being. The divine Spirit equally immanent in all lives that all of them share the same potentiality in participating fully in God and also the love of God is not solely for human being but all other creatures. Yong is aware of the idea that the Buddhist path of salvation is for all sentient beings.[258] However, he seems to overlook the importance of such implication provided by Buddhist soteriology to Christian theology and maintains an anthropocentric discourse when articulating Christian soteriology.

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[256] Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, 103

[257] Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, 172

[258] The meaning of "sentient being" in Buddhism may vary in different traditions, in Mahāyāna tradition, especially in Tibetan and Zen tradition, all beings, including plants and microorganisms, are regarded as sentient beings. See Simon P. James, *Zen Buddhism and Environmental Ethics* (Hampshire, UK: Ashgate, 2004)

Other than the Mahāyāna reading of Christian soteriology, the theory of emergence may provide a vision of cosmic salvation in Christianity as well. As mentioned before, Arthur Peacocke is another theologian that pays great attention to the theory of emergence in his theological construction; also he adopts a soteriology which echoes with the idea of deification in Orthodox tradition. He argues, scientific discoveries on the interrelatedness in nature challenge the anthropocentric tendency of subject-object dichotomy. Scientific knowledge in general, especially Darwinian Theory of evolution and genetics reveal that human beings are constituted by foundational physical entities which are common to the rest of the natural world. Distinctive living creatures including human develop organizationally over time, out of the inorganic world.[259]

Under this emergent perspective, humanity is not a unique attribute of human beings. As the emergence of Homo sapiens in the evolutionary process is a part of the continuum of all life forms. God does not directly create or lure the emergence of Homo sapiens. Other life forms also share the same divine logos as human being in the process of creation; they also have the potentiality of actualizing humanity and spirituality. The divine purpose happens along all lineages of organism that all other life forms also have the potentiality to be in union with God.

Under the pnenmatological perspective advocated by Yong, "mind is a gift of the divine breath at a certain level of complexity—i.e., dependent upon but irreducible to the brain and body function."[260] Furthermore, he suggests that the divine spirit works within the creative process, immanent in each level of emergent complexity. Then, there is no reason for Yong to reject the potentiality of participating in the divine energies in other life forms. It is true that at this stage Homo sapiens is the only organism that developed up to a certain level of complexity. However the creation of God is a continuous process under the emergent perspective, other life forms still have the potentiality of developing to a higher level of complexity in the future. Also, as suggested by Yong, the "spirit" is a self-transcending aspect of human being that enables human being to find the true self in communion with the divine. If the divine spirit is immanent in each level of emergent complexity, then such self-transcending aspect is also inherent in other life forms as well. Thus the idea of salvation of other sentient being is coherent with Yong's interpretation of emergence theory under the pneumatological perspective. In the light of the theory of emergence and the idea of

[259] Peacocke, *God and the New Biology*, 120

[260] Amos Yong, *Pneumatology and the Christian-Buddhist Dialogue*, 82

Thatāhatagarbha in Buddhism, one may open up to a more cosmological interpretation of Christian soteriology.

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Kung Wai-han
PhD. candidate in Religious Studies,
The Chinese University of Hong Kong
waihankung@yahoo.com.hk

Suffering and Mindfulness: Ontological and Psychological

Gerald VIRTBAUER (Vienna/Austria)

Suffering and Mindfulness: Ontological and Psychological

In this preliminary study into suffering and possibilities of understanding it from a contemporary philosophical psychological perspective I try to clarify the following question: "How can one be happy if life ontologically is suffering?" This is a basic question that arises in connection to the Buddha's teachings (Pali *dhamma*), or one may say in life in general. Considering the Buddha's *dhamma*, one may push the underlying assumption of this question even further: The more one sees and understands suffering in all its details, the more one realises that within the world there cannot be an end to suffering, the more one will be able to live and die with genuine well-being, happiness, and inner freedom. Does this sound like a paradox – happiness in suffering? The Buddha shows that it is not. Buddhist psychology (BP) provides both a convincing analysis and logic on the characteristics of life and, more importantly, the meditative means to enquire into life's characteristics through one's first-person experience.

Suffering

In his first sermon after his awakening (*bodhi*), the *Dhamma-cakka-pavattana-sutta*,[261] the Buddha describes the first "noble truth" (*ariya-sacca*) – suffering (*dukkha*) – as follows:

Such, monks, is this noble truth of suffering. Birth is suffering, old age is suffering, illness is suffering, death is suffering, grief, lamentation, physical and psychological pain, and restlessness are suffering. Association with what is disliked is suffering, separation from what is liked is suffering. Not to get what one wants is suffering. In short, the five *khandha*s subject to clinging are suffering.[262]

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[261] *SN* V 420–424.

[262] *idaṃ kho pana bhikkhave dukkham ariya-saccaṃ. jāti pi dukkhā jarā pi dukkhā vyādhi pi dukkhā maraṇam pi dukkhaṃ sokaparidevadukkhadomanassupāyāsā pi dukkhā. appiyehi sampayogo dukkho piyehi vippayogo dukkho. yam p' iccham na labhati tam pi dukkhaṃ. saṃkhittena pañc' upādānakkhandhā pi dukkhā.* (*SN* V 421)

Dukkha may be approached from two directions: On the one hand, such as in this description of the first noble truth in the *Dhamma-cakka-pavattana-sutta*, the fact of suffering is logically inferred. Human beings can reflect that life is subject to change, can never be entirely controlled, and, ultimately, is transient. Hence, one can infer the validity of the first noble truth of Buddhism through reason.

On the other hand, the Buddha points out that suffering is also part of our direct experience. Especially the last sentence in the quotation of the *Dhamma-cakka-pavattana-sutta* above refers to this fact too. The Pali word *khandha* is often translated as "aggregate". More concretely it points to a list of five physical and mental "aggregates" that constitute human nature. However, the *khandha*s are better explained as experiential processes. They are not to be understood as "realities" in the sense of objective entities that "create" a human being. In fact, the Buddha does not seem to be much concerned about any such objective realities in his *dhamma*. He urges his followers to focus on their subjective experience and to analyse the characteristics that are apparent in their experience. If they can do this, then, from the Buddha's perspective, they will arrive at the same conclusions about human nature as he did through his meditative enquiry that led to his awakening – in case they entirely overcome suffering; i.e., they attain awakening too.

Ontological

"The five *khandha*s subject to clinging" that constitute human nature, or, rather (from the perspective of BP elaborated here), that may be discerned in one's experience of oneself and one's world refer to bodily (*rūpa*) and mental (*nāma*) experiential qualities. In the Buddhist literature they are named as (1) body (*rūpa*), (2) feeling (*vedanā*), (3) perception (*saññā*), (4) mental formations (*saṅkhārā*), and (5) consciousness (*viññaṇa*). They are also summarised as the mind-and-body (*nāma-rūpa*); *nāma* here refers to the four mental qualities (2–5), which are not bodily (*rūpa* [1]).

In one's experience these qualities constantly work together from one moment to the next: A human being experiences (1) the body, and he/she experiences in and through the body. Experience is always accompanied by one of five kinds of (2) feeling that are discerned in BP. Feeling can relate to the experience of the body; "bodily" feeling can be pleasurable (*sukha*) or painful (*dukkha*). If feeling relates to the experience of mental qualities it is analysed as joyful (*somanassa*) or displeasurable (*domanassa*). Feeling, in both the body and the mind, can also be

neutral (*upekkhā*, commonly translated as equanimity referring to the body and the mind).

The five *khandha*s are closely linked to the sense organs and sense objects, which is particularly apparent in connection to (3) perception and (5) consciousness. In Buddhism the mind (*manas*) is considered a sense too, with mental occurrences as its objects. A human being always perceives something; perceiving is sixfold and it relates to visible form (*rūpa*), sound (*sadda*), odour (*gandha*), taste (*rasa*), touch sensation (*phoṭṭhabba*), and mental object (*dhamma*). A human being always is conscious of something; being conscious accordingly is sixfold too and relates to the sense organs that enable consciousness of the sense objects. There is consciousness relating to the eye (*cakkhu*), ear (*sota*), nose (*ghāna*), tongue (*jivhā*), body (*kāya*), and mind (*manas*). It is important to note that consciousness here relates to the function and not to the content of "conscious" experience. Hence, is should not be confused with Western notions of consciousness or the unconscious that may have a completely different connotation. Perception and consciousness in Buddhism are closely linked and function together. The Buddhist notion of consciousness (*viññaṇa*) as described in connection to the *khandha*s may be psychologically explained as the first step in apperception.

A short summary from an experiential perspective of the four *khandha*s discussed so far may read: As embodied beings humans constantly perceive and apperceive; the consciousness enabling perception and resulting from perception is accompanied by feeling.

Human identity and the sense of self or personality and the psychological conditioning they are based on can be understood from the perspective of (4) the mental formations. These are the factors that accompany consciousness and create the way one perceives oneself and one's world. For example, if an object is perceived accompanied by the mental factor of greed, the created self and world the human being perceives in this moment will be very different to the same perception of the same object accompanied by the opposite factor – non-greed or generosity. In Buddhism everything is understood from the perspective of cause and effect. So the way in which one conditions and reconditions oneself – and in this way creates and recreates one's personality – from one moment to the next depends on the mental factors that are present in one's consciousness. The Buddha explains mental formations in the *Khajjanīya-sutta*[263] in this way:

[263] *SN* III 86–91.

> Why, monks, do you call them mental formations? "They condition the conditioned", monks, therefore they are called mental formations. Why do they condition the conditioned? They condition conditioned body as body, conditioned feeling as feeling, conditioned perception as perception, conditioned mental formations as mental formations, and conditioned consciousness as consciousness. "They condition the conditioned", monks, therefore they are called mental formations.[264]

Now another summary may be provided including all five *khandha*s: As embodied beings humans constantly perceive and apperceive; the consciousness enabling perception and resulting from perception is accompanied by feeling. How perception and apperception (of a sense object) takes place is conditioned by mental formations. Mental formations are the factors that accompany all perceiving and apperceiving and in this way constantly condition and recondition how one perceives oneself and one's world.

Despite the question what a human being ultimately *is* (a question that does not seem to be of much concern to the Buddha), the Buddha explains that a human being *experiences* (him-/herself and the outside world) based on experiential processes that can be analysed as fivefold – the five *khandha*s. It is a shift of focus in one's perception that is critical for understanding and overcoming suffering: a shift from an identity- and self-view to an experience of oneself in processes.

Coming back to the main question that at this point needs to be answered based on this experiential human ontology, why then are these processes (subject to) suffering? Life ontologically is suffering because of "three characteristics" (*ti-lakkhaṇa*s) of all experiential phenomena: All phenomena are characterised by impermanence (*anicca*), suffering (*dukkha*), and non-self (*anattā*). Given the distinction of knowledge based on inference and knowledge based on direct experience above in connection to the quote on the first noble truth in the *Dhamma-cakka-pavattana-sutta*, the first two characteristics – impermanence and suffering – may be easily inferred. A human being able of a certain degree of reflection knows that he/she will get old, ill, and die at some point. The facts of life always point

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[264] *kiñca bhikkhave saṅkhāre vadetha. saṅkhatam abhisaṅkharontī ti* [*kho*] *bhikkhave tasmā saṅkhārā ti vuccanti. kiñca saṅkhatam abhisaṅkharonti. rūpaṃ rūpattāya saṅkhatam abhisaṅkharonti. vedanaṃ vedanattāya saṅkhatam abhisaṅkharonti. saññaṃ saññattāya saṅkhatam abhisaṅkharonti. saṅkhāre saṅkhārattāya saṅkhatam abhisaṅkharonti. viññāṇaṃ viññāṇatt*[*h*]*āya saṅkhatam abhisaṅkharonti. saṅkhatam abhisaṅkharontī ti kho bhikkhave tasmā saṅkhārā ti vuccanti.* (*SN* III 87)

towards impermanence and suffering. However, from the perspective of Buddhist meditation it is necessary to understand the three characteristics (impermanence, suffering, and non-self) – and the consequences such understanding implies – through direct experience, which, ultimately, is entirely intuitive and beyond language. Only through this understanding can suffering be overcome. If one develops understanding based on direct experience it becomes clear that the self, ultimately, is an impermanent construct and that non-self (the third characteristics of all phenomena), ultimately, is a reality.

The teachings of the Buddha are based on a close examination of nature and the interdependence of all beings and things in nature. They are also based on loving kindness (*mettā*) and compassion (*karuṇā*) for nature and for all sentient beings. From this perspective ontological suffering is a characteristic of nature and life itself, not only of human life. All life is based on the constant exploitation of, violence against, and destruction of other life. The Buddhist "middle way" (*majjhima paṭipadā*) suggests that such insight should not lead to extreme asceticism and self-mortification (with the goal of as much as possible avoiding to cause suffering to other beings in this way, such as in Jaina asceticism), even though extreme asceticism can also be found in Buddhism. Buddhism suggests that causing suffering to other beings should be avoided as much as possible, while at the same time care for one's body and health should not be neglected. The Buddha was critical about extreme practices of non-violence (*ahiṃsā*), such as in Jainism, that he perceived as too self-harming (and in this way, actually, causing violence against oneself).

Psychological

The most important doctrine and list in Buddhism is "the four noble truths" (*cattāri ariya-saccāni*) of (1) the fact of suffering (*dukkha*), (2) "the origin of suffering" (*dukkha-samudaya*), (3) "the cessation of suffering" (*dukkha-nirodha*), and (4) "the way leading to the cessation of suffering" (*dukkha-nirodha-gāminī paṭipadā*). As has become clear through the explanation on ontological suffering, life is subject to suffering and it always will be. So how can there be cessation of suffering in life?

From the Buddhist perspective the human mind theoretically can understand the origin of suffering (the second noble truth) so clearly that it can psychologically free itself from suffering entirely (the third noble truth). Though practically it may be difficult to reach entire cessation, the quality of human life depends on the practical effort to go the way leading to the cessation of suffering (the forth noble truth). The practical training on this way involves training of the mind-and-body through

meditation and ethical behaviour, both of which should lead to increasing understanding of the characteristics of nature. This increasing understanding may, and ideally should, culminate in the cessation of suffering. So BP is a combination of meditative mind training and ethics, which should lead to clarity and understanding and, in this way, to well-being and happiness.

What prevents one from "perceiving things as they are" (*yathā-bhūta-ñāṇa-dassana*, "absolute knowledge and seeing")? The origin of suffering (the second noble truth) is craving (*taṇhā*). Craving leads to clinging (*upādāna*; cf. the *upādānakkhandha*s in the quote on the first noble truth in the *Dhamma-cakka-pavattana-sutta* above). The origin of human suffering, and in this way the origin of life, is based on the continuous clinging to qualities in one's experience. One creates "identities" that do not exist and psychologically relates to one's inner world and to beings and things in the outer world in this way. One may approach phenomena as if they were endowed with permanence (*nicca*), naïve happiness (*sukha*), and an enduring self (*attan*), instead of impermanence (*anicca*), suffering (*dukkha*), and non-self (*anattā*). In connection to this ongoing psychological suffering the Buddha asks the following question in the *Cūḷa-saccaka-sutta*[265]:

> If one adheres to suffering, resorts to suffering, is attached to suffering, and regards what is suffering thus: "This is mine, this I am, this is my self", will one ever fully understand suffering oneself or abide with suffering utterly destroyed?[266]

Obviously, the answer to this question is "no". Why is it so difficult to let go of the psychological "need" to create ongoingly something stable to hold on to, even though, finally, there is only instability and transience? Obviously, everyone has to find the answer to such a question him-/herself. From the Buddhist perspective, the more one lives against reality and the more one approaches life based on craving and wanting the more unhappy one will be. Hence, despite its underpinning of ontological suffering, BP is also a positive psychology. Happiness directly corresponds with ethics. If one overcomes one's selfishness and one behaves in a way that is wholesome to oneself and others, one will actively work on reducing suffering. If one understands one's own suffering, one will understand the suffering of others and the

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[265] *MN* I 227–237.

[266] *yo nu kho dukkhaṃ allīno dukkhaṃ upagato dukkhaṃ ajjhosito dukkhaṃ: etaṃ mama, eso 'ham-asmi, eso me attā ti samanupassati, api nu kho so sāmaṃ vā dukkhaṃ parijāneyya dukkhaṃ vā parikkhepetvā vihareyyā ti.* (*MN* I 233)

suffering of nature and of life and one will strive towards reducing suffering as much as possible. From this perspective of Buddhist psychological ethics, one's own suffering and happiness can never be divided from the suffering and happiness of others. Intentionally to do harm against others is to do harm against oneself and intentionally to work for the well-being of others is to work for one's own well-being.

Mindfulness

Mindfulness has become a well-known concept and practice in the West. Especially the *mindfulness-based interventions* movement that was initiated by John Kabat-Zinn in the USA in the late 1970s has had a significant influence on Western health systems, in countries such as the USA, Canada, the UK, and, to a lesser extent, Germany. In the recent discourses of the science of mindfulness there is much discussion about how clinical mindfulness and Buddhist mindfulness (the practice clinical mindfulness is rooted in) relate to each other. Is Buddhist and clinical mindfulness the same? How and in which areas can mindfulness be applied? What is the role of ethics? Such and similar questions lead to interesting dialogues. Here I suggest that the distinction between Buddhist mindfulness and clinical mindfulness makes sense (and, indeed, is necessary), even though it is often difficult, and not really useful, to draw clear lines between the two. The goal of both approaches to mindfulness is to help people reduce (or ideally overcome) their suffering; but what kind of suffering?

Buddhist

In the *Satipaṭṭhāna-sutta*[267] the Buddha describes mindfulness (*sati*) in this way:

> Monks, this is the direct way for the purification of beings, for the overcoming of grief and lamentation, for the disappearance of physical and psychological pain, for the attainment of the right way, for the realisation of *nibbāna* – namely, the four foundations of mindfulness.[268]

[267] *MN* I 55–63.

[268] *ekāyano ayaṃ bhikkhave maggo sattānaṃ visuddhiyā soka-pariddavānaṃ samatikkamāya dukkha-domanassānaṃ atthagamāya ñāyassa adhigamāya nibbānassa sacchikiriyāya, yadidaṃ cattāro satipaṭṭhānā, ...* (*MN* I 55–56)

The four "foundations of mindfulness" (*satipaṭṭhāna*s) refer to contemplations (*anupassanā*) of the body (*kāya*), feelings (*vedanā*), consciousness (*citta*), and specific "experiential qualities" (*dhamma*s); 13 meditation methods of contemplating mental and bodily phenomena are included in these four foundations. The goal of Buddhist mindfulness, as explained in the *Satipaṭṭhāna-sutta*, is extinction (*nibbāna*), the end of suffering (the third noble truth). *Sati* is both a mental quality and a method of contemplating that, ultimately, should lead to understanding of the "three characteristics" (*ti-lakkhaṇa*s) of impermanence (*anicca*), suffering (*dukkha*), and non-self (*anattā*) of all experiential phenomena. Hence, in philosophical psychological terms "right mindfulness" (*sammā-sati*) is a method to understanding ontological suffering and to understanding and overcoming psychological suffering.

Sammā-sati is a key part of the way leading to the cessation of suffering (the forth noble truth). The forth noble truth comprises "the noble eightfold path" (*ariya aṭṭhaṅgika magga*), which according to the Buddha's teaching is "the way leading to the cessation of suffering" (*dukkha-nirodha-gāminī paṭipadā*). However, *sammā-sati* is only one factor of this eightfold path, which also includes (1) right view (*sammā-ditthi*), (2) right resolve (*sammā-saṅkappa*), (3) right speech (*sammā-vācā*), (4) right action (*sammā-kammanta*), (5) right livelihood (*sammā-ājīva*), (6) right effort (*sammā-vāyāma*), ([7] right mindfulness [*sammā-sati*],) and (8) right concentration (*sammā-samādhi*). (3) Right speech, (4) right action, and (5) right livelihood are ethical (*sīla*) dimensions; (6) right effort, (7) right mindfulness, and (8) right concentration are factors concerning the cultivation of meditation and concentration (*samādhi*); and (1) right view and (2) right resolve are factors necessary for the development of the wisdom (*paññā*) that, if fully developed, leads to the cessation of suffering. However, practically all these eight factors have to work together on the way leading to the cessation of suffering.

The application of the main Buddhist doctrine – the four noble truths – thus depends on three dimensions – ethics, cultivation of mind through meditation and concentration, and the understanding of suffering (wisdom). From the Buddhist perspective (and this counts for all Buddhist schools [and especially for those that are based on a culture of meditation]), suffering and mindfulness cannot properly be understood outside the Buddhist system (and its main doctrine of the four noble truths) of approaching the limitations and potentials of human life. Properly understood, the four noble truths also show that ethics and psychology (of well-being) are indivisibly connected. The cultivation of a "mindful" mind depends on and is rooted in "mindful" behaviour. In BP, happiness and well-being depend on the

overcoming of self-centredness and egoism. Though there ultimately cannot be an end to (ontological) suffering in the world, one's psychological well-being in the world depends on how one approaches the world, and one's environment and all beings in this world; and on how one relates to oneself and one's self as indivisibly embedded in the processes of this world.

Clinical

Can such a (Buddhist) programme be clinically applied; and does clinical mindfulness do so? There cannot be a clear answer to this question, but it is positive to note that the reflection of the Buddhist roots of mindfulness and of Buddhist ethics in connection to the practice of mindfulness plays a key role in the current discourses of mindfulness-based psychotherapy. Unlike some critics from the field of Buddhist Studies, I believe that there is no reason why mindfulness should not be applied to help people, in clinical-psychological terms, to function better. The key motivation of psychotherapy – to help people in distress – certainly agrees well with the Buddhist goal of overcoming suffering. It may also be added that the "mundane" goal of functioning well in the world is approached in Buddhism too. Buddhism has had a big influence on the development of traditional Eastern medical systems and it has developed its own approaches to healing. Pragmatically, the Buddha and his *dhamma* may be compared to a doctor/therapist and his medicine/therapy.

However, Buddhism, of course, does not stop by making one function better in the world, but aims towards clarifying one's understanding of oneself and of the world. The "real" Buddhist cure depends on this clarifying dimension that, necessarily, asks one for a critical reflection and practice that may go far beyond the goals of conventional psychotherapy. It also needs to be mentioned that authentic Buddhist mindfulness cannot be applied for reaching other goals than understanding and overcoming suffering. This, as it is put in an important discourse, ultimately means to reach the end of one's world;[269] and in this way entirely to stop clinging to this world. As has become clear, from the Buddhist perspective the way to the end of (psychological) suffering depends on Buddhist ethics. The danger of the increasing commodification of the ancient practice of mindfulness within the Western mindfulness "boom" should be critically observed.

[269] *Rohitassa-sutta*, *AN* II 47–49.

Conclusion

The goal of this preliminary study into suffering in Buddhism has been to introduce, in contemporary philosophical psychological idiom, a distinction between ontological and psychological suffering. Ontologically there cannot be an end to suffering in life and in the world. However, through insight into the characteristics of phenomena a human being is able to reduce psychological suffering and he/she may be able to overcome psychological suffering entirely.

Mindfulness is the critical factor on the way to the end of suffering. However, it is only one factor of this way, which is described as eightfold. Mindfulness has to be understood within this eightfold structure that includes the three dimensions of ethics, meditation and concentration, and wisdom. Mindfulness, indeed, may be the factor that most clearly sustains and develops the other factors. However, mindfulness as a mental quality always depends on other (wholesome) mental qualities that manifest in ethical behaviour. It can be neither understood nor established outside of ethics.

This study also shows the need for comparative and interdisciplinary work, based on original sources, if a practice such as Buddhist mindfulness is to be integrated accurately into Western psychological thought. To what degree authentic Buddhist psychology and ethics can be integrated into Western science is a question that in this paper could only be explored cursorily. BP is a psychology that enables in-depth reflections of the intentions and motivations of humans, and, hence, of all systems humans create, such as modern Western science. Such reflection may enable us to understand better how different systems and their underpinning motivations may increase or reduce suffering.

Abbreviations of Classical Works

References to volume and page[s] [and line(s)] of the Pali Text Society ed. Consulted and recommended translations in brackets (my translations in the text slightly differ).

AN – *Aṅguttara-nikāya* (trans. Bodhi, 2012)

MN – *Majjhima-nikāya* (trans. Ñāṇamoli & Bodhi, 2005)

SN – *Saṃyutta-nikāya* (trans. Bodhi, 2000)

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Gerald Virtbauer
Department of Transcultural and Historical Research in Psychotherapy,
Sigmund Freud University Vienna
Board of the *KoPhil*, Association of Komparative Philosophy and
Interdisciplinary Education, Vienna
gerald.virtbauer@sfu.ac.at

Morita Therapy:

An experiential reconciliation of human being & nature

John R. MERCER (Melbourne /Australia)

This paper presents Morita therapy, a Japanese intervention for anxiety-based disorders, as an example of how the schism between the human being and nature can be experientially moved toward reconciliation. Classic Morita therapy employs a staged, progressive and experiential approach to treatment, in stark contrast with more cognitive and dialogical approaches. Morita's therapeutic system is underpinned by non-theistic Zen as both meta-theory, and phenomenological praxis, making it a remarkable opportunity to explore therapeutic theory through the lens of comparative philosophy.

1. Introduction

As a discipline with the aim of understanding beyond the constraints of specific paradigms, by comparing and contrasting them from the space beyond and between (Hashi, 2013), comparative philosophy can learn much from a deeper analysis of Morita therapy. Morita therapy offers not only an alternative approach to therapeutic intervention, but also exhibits entirely different epistemological and meta-theoretical foundations to its western counterparts.

All therapeutic paradigms originate in a philosophical position about the nature of being human as their point of origin. Unfortunately, for many therapeutic models these philosophical foundations remain implicit, subtextual, obscure, fragmented or conceptually underdeveloped. By not fully developing and articulating a philosophical theory of self, on which to then establish a theoretical conceptualisation of pathology, and a subsequent formulation of theory and method for intervention, many contemporary therapies are remiss. Older forms of therapy, such as Psychoanalysis and Morita therapy, did precisely this. They developed a philosophical theory of the person as a conceptual platform and then established subsequent theories of psychopathology and treatment consistent with the initial philosophical point of origin. It is the fact that Morita developed a system of therapy based on a radically distinct

philosophical and epistemological platform, which makes it such a relevant subject for comparative philosophy.

Morita therapy is almost a century old. It was developed between 1919 and 1928 by Morita Shōma (1874-1938) a Japanese psychiatrist and therapeutic theorist. Morita was trained in the German psychiatric theories typically taught in Japanese universities of his era, but many years of clinical practice, personal experience, case study and trial and error, brought him to develop his own method, which he referred to as his 'Taiken Ryōhō, his 'natural/experiential' method (Fujita, 1986), the name 'Morita Therapy' being used by his successors after his passing.

Morita was widely read, and well versed in the work by western theorists such as Husserl, James, Freud and Nietzsche. He was a contemporary in time and place with the Zen translator/philosopher Suzuki Daisetz (1870-1966), and also the founder of the Kyoto School, Nishida Kitaro (1870-1945), who de-theisised and articulated Zen as an operational philosophical system (Kopf, 2001; Nishida, 1921/1990). Just as Zen permeated the uniquely phenomenological philosophy (Sakakibara, 2010) of Nishida's Kyoto School, Morita's original therapeutic theory and processes were also described with Zen terms and concepts (Rhyner, 1988) and permeated with non-theistic Zen principles (Mercer, 2015). This fundamental relationship between Morita's therapeutic system and non-theistic Zen, defines the operationalised relationship between Morita therapy and nature.

Morita's approach has many unique features for the western philosophical or therapeutic reader. To begin with, it defines the natural human condition in a different way, and frames anxiety-based disorders as pathological divergence from that natural condition. Morita therapy uses natural rhythms, contexts and processes to return an individual to their natural condition (Le Vine, 1994). This is a return to one's original nature, a point at which consciousness is radically and intuitively re-oriented away from the 'discriminating' content of mind, toward the stream of phenomenal experience.

Complex, subtle and multidimensional notions of 'nature' are threaded through Morita's theories of the person and therapy. His understanding of nature was profoundly influenced by Zen and Shinto (Kitanishi, 1992), and he believed there was a fundamental connection between an individual's psycho-physical health and their relationship with nature (Kondō, 1998). Because Morita's understanding of nature

was a Zen understanding of nature, to grasp the relationship between Morita therapy and nature, it is imperative to first understand the relationship between nature and Zen.

1.1 The problem

'Self' is the largely unexamined instrument through which reality and nature are lived and experienced. It is also the abstract membrane which impedes 'pure experience' of reality and nature (Nishida, 1921/1990). From a Zen perspective, the core problem of the human condition is that as a by-product of language, we have 'thought' a separate 'Self' into existence. This process has set its cognitive-linguistic product apart from, and at odds with, the reality in which it was embedded, and from which it emerged.

This setting apart and at odds, in turn, has given rise to a relationship of *profound ambivalent tension* between the 'Self', and other modes of subjective experience. We have enmeshed and then fused 'Self' and subjectivity. We have woven a constructed 'Self' into the fabric of our subjective being, as an inadvertent function of languicised cognition. In this fusion the constructed 'Self' has taken declarative and agentic primacy, relegating subjectivity to the secondary and utilitarian status of a function of itself: subjectivity as an artefact of, a perceiving position of, the 'Self'.

The invisible, unchallenged, implicit assumption is that the relative-subjective 'Self' is a persisting object (Kopf, 2001) an essential entity (Kasulis, 1981). We forget, in the long shadow cast by the 'Self', that subjectivity came first and was the context in which the 'Self' gathered its form and constitution. We forget; if the 'Self' breaks, the subjectivity remains to live the experience of brokenness. We dismiss the possibility that there is a place beyond the 'Self', although we crave, postulate and then rail against constructions and projections of an apparent divine. The implication of this undisclosed, implicit, deeply habituated, linguistically reinforced fusion of 'Self' and subjectivity is that the 'Self' will always impede and colour our subjectivity.

From a Zen perspective, this 'Self' is the fundamental problem of the human condition, the 'disease of the mind' (Sōsan, 606, in Merzel, 1991). "You ceaselessly chase things and *turn them into the self*, and chase the self and *turn it into things*" (Dōgen, 2004, p. 56). Consistently, for Morita, this 'Self' is the fundamental problem in anxiety-based disorders. He conceptualised anxiety in phenomenological terms: "too much 'self' stands out as figure against the background of the perception of the external world" (Reynolds, 1976, p. 10). From Morita's perspective, the prominence

of the constructed self over more natural modes of subjectivity underpins pathologies of self-reflection and neurotic anxiety in particular.

Both Self and suffering in Morita therapy are conceptualised from a Zen perspective (Kondō, 1992). Morita saw 'Self' as an impediment to the natural relationship between human being and nature. For Morita, self-as-ego impedes self-as-authentic-human-nature. His key to reconciliation of the human being with their own authentic nature was the self-overcoming of pathological self-reflection (pathological relative subjectivity) by encounter with self-as-nature (pure experience of absolute subjectivity), resulting in a re-balanced human system, a return to one's 'natural' human condition. He understood his own method of anxiety treatment as a form of therapeutically facilitated self-overcoming. For Morita, this human problem was a Zen problem, with the roots of its resolution firmly sunk in non-theistic Zen principles.

2. Non-theistic Zen

From a western perspective, and implicit in western psychotherapeutic models, Self remains understood as an 'entity' (Fowler, 2004). We 'think of' this entity, we cogni-linguistically construct it, using the personal pronoun 'I' (Kojima, 1998), and then reinforce the fabrication with a perpetual acquisition of mental objects and associations in what might be referred to as 'clinging' (Mikulas, 2010).

From a Zen perspective, self-as-entity "is a fabrication of the mind" (Kōndo, 1983). Zen understands the self as a *process/*event (Pawle, 2009; Kasulis, 1981). This conceptualisation incorporates mind, body and nature as a monadic structure of self (Kitanishi, 2010), as an all-inclusive contextual process/event, rather than a discrete entity (Pawle, 2009).

There is more than one school of Zen in contemporary Japan, some leaning heavily toward the soteriological theistic end of the spectrum, while others lean more toward the non-theistic phenomenological end. Non-theistic Zen is a system of phenomenological practice (Kopf, 2001; Van Der Braak, 2011; Mikunas, 1993), but it is also constitutes a robust meta-theory (Mercer, 2015).

Non-theistic Zen as meta-theoretical perspective is constituted by core principles which are primary and prior to Zen as systematised in schools and sects. Rinzai and Sōtō are the two predominant Zen practice systems which clearly integrate theoretical

subsystems. For example, both feature explicit aspects of existential and ontological philosophy. While degree and emphasis varies, both share common content and process ground with heuristics, phenomenology and hermeneutics. They both exhibit consistent dual logic systems, as evidenced by the Rinzai practice of kōan study (Hashi, 2008), and both demonstrate unarticulated but highly utilitarian semantic sub-theories aimed at experientially undercutting the fracturing and dualising functions of language. Both also employ implicit forms of object relations and psychodynamics (Hill, 2004). It is at once transcending, while integrating, such theoretical subsystems, which defines non-theistic Zen as a meta-theoretical system.

Zen philosopher Dōgen Eihei (1200-1253) broke down human experience into four distinct onto-existential modes (Kopf, 2001; Dōgen, 1253/2007), four intertwined experiential-perceptual-referential positions. In practical, applied terms, this provided the phenomenological apparatus to reach beyond normal human experience, to methodically arrive at a place beyond 'Self' as it is understood in western philosophical traditions. It provided a consistent methodical process for re-orienting an individual from remaining unconsciously fixed in one onto-existential mode of subjective experiencing, toward cultivating a capacity to spontaneously respond with the most appropriate mode for each moment to moment experience.

Dōgen asserted that "to learn the self is to forget the self; to forget the self is to be manifested by the ten thousand things" (1253/2007, p. 32). This makes profound sense when we understand self as a process of multiple interpenetrating onto-existential modes of subjective experience (Dōgen, 1253/2007; Kopf, 2001; Kasulis, 1981; Nishida, 1921/1990), and constitutes a radical leap from implicit western assumptions about self-as-entity and the primacy of the 'I', to an explicit entreaty to discover the true nature of the self. Understanding self in this way enables a deeper analysis of the relationship between Morita therapy and nature.

Like Dōgen, Nishida (1921/1990) framed the phenomenology of self as a process of co-emergent and interpenetrating modes of subjective experiencing, set against the ground of absolute 'nothingness' (Saikabara, 2010; Kopf, 2001). These modes were the Abstract (intellectual/relative), the Lived (interpersonal/relative), the Phenomenal (embodied absolute) and the Actual (absolute) (Kopf, 2001). Nishida offers a Zen phenomenology of the self as a process of multiple subjective modes, as a radical alternative to the Cartesian dualism and body-mind split implicit to western philosophies.

Kojima (1998) provides model of self as multi-modal subjectivity based on semantics of the personal pronoun ‘I’. He presents three different modes of subjective experience of the self, which in a healthy situation, provide what he refers to as a balanced and optimally functional ‘Kinaesthetic unity’. Kojima’s semantically distinguished modes of subjective experiencing are the ‘Serial I’, ‘the Primal I’, and the ‘Thou’. The Serial I corresponds closely to the ‘abstract’ or ‘relative’ subjective mode, while the Primal I corresponds closely to the ‘actual’ or ‘absolute’ subjective mode. Kojima’s Thou represents unconstructed self in relation to ‘otherness’. When used in conjunction with Nishida’s onto-existential modes, Kojima’s model provides a robust explanatory system to describe phenomena of self and self-overcoming from the non-theistic Zen perspective.

If misapprehension of self-as-entity is the problem, then *áskēsis* is non-theistic Zen’s answer. Van der Braak (2011) uses the term áskēsis to identify the perpetual practice of ‘self-overcoming’ toward the ends of overcoming the illusion of self-as-object, and experiencing intimate, unmediated reality contact. Áskētic practice (as distinct from ascetic) is the process which, through experiential understanding, evolves the practitioner toward a felt sense of self-as-multi-modal-subject, a process which experientially overcomes self-as-object and facilitates an unprecedented and intimate capacity to blend with reality as it is. The self, which is overcome in the process of áskētic self-overcoming is self-as-object, and the self which is arrived at beyond self-as-object is self-as-multi-modal-subject.

This áskētic process of embodied experiential self-overcoming is a perpetual phenomenological praxis, a continual return to natural acting intuition and pure experience (Van der Braak, 2011). The Self which is overcome is the abstract or relative onto-existential mode of subjective experiencing, or Kojima's ‘Serial I’. The place at which one arrives after the Serial I has been overcome is the actual or absolute onto-existential mode, or Kojima's ‘Primal I’. This balanced kinaesthetic unity is a functional synthesis of interpenetrating modes of subjective experiencing, resulting in natural movement between modes as required by the constituent elements of a given moment: it is one's original nature embedded in the context of reality as it is.

“By a process of dismantling all physical and psychologic phenomena” (Kelman, 1960, p. 76) non-theistic Zen methodically ‘de-fuses’ self and subjectivity (Sekeda, 1985), decoupling subjectivity from the constructed self. Over time, the practitioner gains incrementally increasing access, to subjectivity defused from Self. Zen draws on

experiential heuristic, phenomenological and hermeneutic methods to facilitate a shift on the onto-existential mode of the practitioner, a shift from constructed relative self as prime, to absolute subjectivity as prime. This "double orientation perspective" (Krynicki, 1980, p. 245) allows the experiencing subject to perceive both modalities concurrently in their co-emergence and interpenetration. "Put simply it is a non-dual field of pure experience in which mind-body/subject-object distinctions are not simply weakened but dissolved altogether..." (Krueger, 2007, p. 8).

While de-fusing self and subjectivity, as a phenomenological praxis, non-theistic Zen also 're-fuses' the body-mind that Descartes separated as a basis for western epistemologies. This "…leads to a clear perception of given things without subjectivity interfering..." (Hashi, 2013, p. 22), and at the same time "... a transcendence of the limiting relativity between subject and object" (Kopf, 2001, p. 66). Consequently, Zen self-as-process offers profound philosophical contrasts to therapeutic paradigms built on implicit assumptions of Cartesian self-as-entity with its inherent mind-body split. This in turn has profound implications for the relationship between human being and nature.

Our usual construction of self-as-subject preoccupied with self-as-object, is *the* phenomenon impeding direct and intimate contact with reality and nature as it is. This perpetual experience of a Self misapprehended as object-entity, and therefore reality unapprehended and consequently constructed, is non-theistic Zen's 'delusion'. For Zen we are not what we 'think'. While thinking remains a phenomenon of mind, phenomenologically, we are *what we are* 'beyond thinking' (Dōgen, 1253/2007).

By contrast, when we begin to conceptualise self-as-process rather than self-as-entity, a variety of operational onto-existential positions emerge. For example:

- Self-as-embodied-sentient-process-of-self-reflective-preoccupation-with-self-as-object
- Self-as-asketic-practice/experience-toward-overcoming-self-as-object
- Self-as-embodied-sentient-process-of-multi-modal-reality-oriented-self-as-subject

The first of these is perpetuation of the illusion of self-as-object, delusion in multitude of forms (including pathologies of self-reflection such as neurotic anxiety). The second is some form of áskētic practice, an embodied practice of perpetuated overcoming of self-as-object, the process of experientially self-overcoming that delusion. The third is a lived grasp of self-as-multi-modal-process-of-subjectivity, a

form of subjective experiencing beyond the invisible and habituated traps of self-referencing which lead to pathologies of self-reflection (e.g. anxiety or narcissism). It is a subjectivity with a uniquely intimate proximity to phenomena, free of the fetters of 'self-reflective-preoccupation-with-self-as-object'. It is to experience the things themselves without the impediment of the Self.

Beneath this 'natural', functional, relative-subjective illusion of self-as entity, other non-relative existential modes are embedded in, and undifferentiated from, the fabric of monadic reality, in effect rendering them at once (non-dually) 'as nature' as well as 'of nature'. In so far as this is the true nature of reality as it is (arugamama), this is the deeper, truer truth of nature proper - it is the nature of nature. As Dōgen asserted, that "even to speak of a relationship between Buddha-nature and phenomena is incorrect, because they are not two separate entities that can interrelate" (Shaw, 1985, p. 117).

Based on the non-theistic Zen understanding of the person as multiple interpenetrating modes of subjective experiencing, Zen's relationship with nature is at once non-dual and multifaceted. One aspect of the relationship is the understanding of self-nature, or subjectivity, our human condition. Another is understanding self-nature as an embedded micro-process of nature proper, the relative-subjective Self experienced as embedded in nature-as-context. A third is nature experienced in the absolute subjective (non-dual) onto-existential mode, where there is no 'self' to be experienced as 'other-than' nature.

From a Zen perspective, these are subtly differentiated and interpenetrating facets of the relationship between human being and nature, and they are at the heart of the contextual features and process mechanisms in Morita's therapeutic system. This brief treatment of non-theistic Zen provides a philosophical context in which to present the therapeutic theory, structure and process of Morita therapy.

3. Morita's 'natural' Therapy: Taiken Ryōhō

Morita therapy has been referred to in Zen terms as a therapeutic form of *'upaya'*, or 'skilful means' (Triana, 1978). Morita called his system Taiken Ryōhō. The Japanese word 'taiken', used to render the English word 'experience', is infused with a nuance that infers 'embodied' experience and embeds that embodiment intimately with nature (Sharf, 1993). Morita conveyed something fundamental by using 'taiken' to describe his therapy: embodied experience as an embedded aspect of nature.

3.1 Therapeutic theory

Consistent with a Meiji Japanese naturalist perspective influenced by Zen and Shinto, Morita understood a natural life force (*ki*) energising our human nature. He understood this natural life force to have counterbalanced inclinations: *sei ki* – the outward-moving, centrifugal, creative, ontological impulse for self-overcoming; and *shin ki* – the inward-moving, centripetal, reflective, existential tendency for self-preservation (Fujita, 1986). The perpetual dynamic interplay of these forces maintains a natural blend of spontaneous creativity with reflective self-preservation.

Balance of these forces, results in healthy, natural, carefully creative and appropriately spontaneous desire for life (*sei no yokubō*). However, conflicts emerge as a result of imbalance in these dynamic forces, and are highly variable, dependent on individual pre-disposition, environmental and experiential factors. An unbalanced system results in a self-perpetuating spiral of centripetal life-force subsuming centrifugal life-force, manifesting as reduced, internalised scope and diminished functional capacity - an unnatural spiral toward unhealthy stasis of internally oriented, self-preserving fixation.

Self impedes direct human experience of reality as it is, to the extent that self-reflection predominates consciousness. Such narrow, fixated self-preserving self-preoccupation constitute pathologies of self-reflection, and in particular, neurotic anxiety.

Morita identified a variety of consistent mechanisms at play in such pathologies of self-reflection. He identified a reinforcing interaction between attention fixation and somatic symptoms, which he referred to as psychic interaction (*seishin kogō sayō),* resulting in exaggerated and narrowed preoccupation with somatic phenomena. Ideational contradiction (*shisō no mujun*), strong habituated attachment to ideas about how reality and one's own life and experience 'should be' is a second mechanism which interacts with and perpetuates the first. The individual also employs ruminative, strategic, discursive/cognitive manipulations and strategies (*hakari*) (Fujita, 1986), in futile efforts to force reality to yield to ideational contradiction. Morita called this complex of interacting pathological mechanisms at the core of neurotic anxiety *toraware.* Morita's toraware, the pathological interplay of attention-evaluation-somatic experience, relates directly to the unnatural dissociation between mind and body.

Morita's conceptualisation of neurotic anxiety as unnatural condition, was the schism between relative-Abstract (Serial I/self-preserving/*shin ki*) and absolute-Actual (Primal I/self-overcoming/*sei ki*) onto-existential modes of subjective experience, leading to a profound and arresting internal ambivalent tension. The pathological mechanisms of toraware perpetuate and reinforce this tension, further dissociating the relative-subjective Serial I from the absolute-subjective Primal I. This results in an unbalanced and neurotically skewed onto-existential system, with one mode of subjective experience pathologically eclipsing the alternative mode of its natural counter-balance, thereby inhibiting natural sei no yokubō.

In identifying toraware at the mechanistic core of neurotic anxiety pathology, Morita identifies the opposition of the individual Abstract/relative-subjective ego to the manifest nature of reality as it is. In doing so, he is completely aligned with a Zen conceptualisations of delusion and suffering (Triana, 1978).

3.2 Therapeutic structure

Morita therapy has a particular form of therapeutic structure. It is a residential treatment, where patients reside within the therapeutic context, and it is staged, with patients moving through four progressive stages of therapeutic process. The first stage is the ‘Secluded Bedrest’ stage, where the patient remains for a duration between five and ten days. The patient is accommodated in a small room with natural light and sound only. They remain lying down, resting, rising only briefly to eat the food which is brought to them, and to use the bathroom when necessary. No electronic devices, or reading or writing is permitted during this period. It is a time to rest and recalibrate the patient’s central nervous system (LeVine, in press). This first stage is pivotal for reasons which will become clear, and the duration of the bedrest stage varies depending on the therapeutic experience of each individual patient.

When the Morita therapist assesses the patient to have moved through the requisite experiential process of the Bedrest stage, patients are formally moved into stage two, referred to as the ‘Light Activity’ stage. Traditionally, at the beginning of this stage patients are moved into nature and/or forms of artistic activity, such as garden sketching, painting, collecting fallen leaves, bonsai, and wood carving. The activity in the early part of stage two is carefully selected by the Morita therapist based on

observations of the individual's temperament, interests and natural orientation (LeVine, 2016). Emphasis in stage two is on full engagement with nature and the natural, and interaction with others is kept to a minimum. The Morita diary is also implemented in stage two and remains throughout the later stages. It is a device where the patient records the days activity, and it is then given to the Morita therapist overnight for comment, and returned in the morning. This constitutes an interesting interplay of a hermeneutic phenomenological device with nature-oriented activity.

The later stages of Morita therapy resemble western 'therapeutic community' models, with residents working collaboratively in many aspects of day to day functioning of the facility. As the patient progresses to stage three, the 'Heavy Work' stage, they become more engaged with other, and take greater roles and responsibilities within the rhythms and activity of the community. This might involve heavier garden work, or cooking and cleaning of the community space. By necessity, task-oriented communication with others increases. Stage four of Morita therapy, the 'Reintegration' stage, is a return to social life and functioning outside the community. It emphasises extrapolating experiential learnings from the earlier stages of treatment to external contexts and experiences. Patients begin to look beyond the therapeutic context, begin making and attending appointments, and communicating with family and friends in preparation for transitioning out of the therapeutic environment.

The residential, staged and progressive nature of Morita's therapeutic system cannot be underemphasised, because it is this structure which provides the unique experiential and ecological components of his treatment process.

3.3 Therapeutic Process

Kojima's (1998) model will be used to present a simple explanatory model for Morita's therapeutic process. Morita aimed to return an individual to their natural condition, as the starting point that original, natural condition has been presented previously. It is the harmonious balance of the abstract, relative-subjective, Serial I, with the actual, absolute-subjective Primal I, together in relation to Thou as both specific 'other', and non-specific 'otherness' as the natural environment. From Morita's perspective, this natural condition, sees *shin ki* and *sei ki* in counterbalanced harmony, and the onto-existential human system in a balanced dynamic blend of inward and outward orientation of consciousness, of spontaneous creative movement and reflective self-protection.

This is the human being with clear discernment of reality as it is, able to respond spontaneously and appropriately to whatever arises and passes in moment to moment experience. The ideal of 'no preferences', pure experience or reality as it us, without attachment or clinging to constructions of reality and how it 'should be', is difficult to attain and sustain.

For Morita, it is fixated attachment to ideas about how reality *should be*, inherent to the abstract, relative-subjective Serial I, and subsequent resistance to reality *as it is*, that constitutes the core of pathologies of self-reflection, and neurotic anxiety in particular. This is a pathological condition in which, through overemphasis on internalised orientation of consciousness, the Serial I takes primacy over, and subsumes the counterbalancing Primal I. The 'natural' I-Thou relation is impeded by self-reflection/projection of the Serial I, resulting in a pathologically unbalanced onto-existential human system. This is the abstract, relative-subjective Serial I as a pathology of self-reflection.

Conceptualising neurotic anxiety as a pathology of self-reflection, Morita understood that anxiety treatment needed to constitute a form of therapeutically facilitated self-overcoming. In a way that parallels Zen's embodied experiential process of self-overcoming, Morita used the Secluded Bedrest stage to therapeutically facilitate an embodied experience of self-overcoming the abstract, relative-subjective Serial I, by encounter with self-as-nature, pure experience of the actual, absolute-subjective Primal I.

The Secluded Bedrest stage is pivotal because the natural light, sounds and rhythms of the experience provide a therapeutic context-as-process. For Morita, it was imperative the patient not only experience their symptoms, but the symptoms escalate to their natural peak. "The main purpose of this therapy is to radically dismantle the clients mental suffering and pain, and let her or him experience the mental state I call 'immediate liberation through confrontation with one's suffering'" (Morita, 1928/1998, p. 36).

We are conditioned to avoid an escalation of our mental and/or physical discomfort or distress, so we rarely gain insight into its true nature. To avoid anxiety is to reinforce our attachment to beliefs that it needs to be avoided, while to experience it fully, and move through it, is to understand it from an experientially different perspective. Morita called this kind of experiential 'knowing-of', in contrast to abstract intellectual or dialogical 'knowledge-about', *taitoku*, an embodied

experiential understanding. It is a core aspect of his therapeutic process, and the natural light, sounds, tastes and rhythms of the Secluded Bedrest stage that facilitate the experience through context-as-process.

What the individual learns experientially when they fully move through suffering, is after its peak, the phenomenon dissipates naturally. The mental noise of subjective distress quietens, and there is a completely natural shift in the orientation of consciousness from internal and fixated, to external and peripheral. This is an experiential modal shift from the abstract, relative-subjective Serial I, to the actual, absolute-subjective Primal I. This is *mushojū shin,* a radical experiential reorientation from fixated/internal to external/peripherally oriented consciousness, and it is akin to non-theistic Zen's dropping or forgetting the Self (Dōgen, 1253/2007).

For Morita, this is "where my special therapy begins" (Morita, 1928/1998, p. 31). He understood orientation of consciousness mediates the onto-existential mode of subjective experiencing, and he facilitated this modal shift experience for his patients toward the self-overcoming of anxiety. As a therapeutic process, the Secluded Bedrest stage performs a similar experiential function as áskētic practice in non-theistic Zen, and facilitates an authentic acceptance of experience as a complete absence of psychological resistance.

This modal shift to the experiencing position of the actual, absolute-subjective Primal I, constitutes a therapeutic áskēsis, an experiential self-overcoming of relative-self-as-entity. When this occurs, "pre-existing absolute consciousness leaps forward once the intellectual self no longer mediates experience" (LeVine, 2016, in press). The I-Thou relation is dissolved by an experiential understanding of 'no-self', and consequently, the onto-existential system of the human being is reset.

For the Morita therapy patient, this re-synthesis of reality contact in a different onto-existential mode, provides a lived experience of 'contextualising' the incessant material of their abstract, relative-subjective Serial I. This fundamentally alters their phenomenological relationship to that material, which is no longer experienced as 'the Self', but as material emerging in the context of a more absolute tacit understanding of self. "Upon realising no-self, fixated or pathological attention disappears and attention becomes free to function optimally" (Pawle, 2009, p. 55).

A fairly close literal translation of the term 'arugamama' is 'as it is'. To attempt to convey the meaning of the term more adequately it might be framed as phenomenological reality as it is (Reynolds, 1976), and for Morita, who borrowed the

term directly from Zen, arugamama meant the ‘suchness’ or ‘isness’ of phenomena (LeVine, in press), pure experience of unconstructed reality as it manifests. After the experience of mushojū shin, and therefore an embodied, tacit understanding of the implications of orientation of consciousness, pure experience of reality as it is, arugamama, becomes possible. If mushojū shin is where Morita’s therapy begins, arugamama is where it ends.

There is an important qualitative distinction between arugamama as an experiential phenomenon, an embodied understanding, and the idea of ‘reality-as-it-is’ as an abstract concept. “Arugamama, the condition of casting off the artificial ego and returning to authentic human nature” (Fujita, 1986, p. 51). The experiential understanding of peripherally oriented consciousness, and its impact of mode of onto-existential mode of subjective experiencing, revealing reality ‘as it is’, completely uncoloured by ideas about how it ‘should be’, is the therapeutic process at the core of Morita therapy. It is a natural process, facilitated by natural context-as-process (Mercer, 2015), and it dissolves the abstract, relative-subjective Serial I distinction between self-as-subject and nature-as-object.

This is the re-synthesised kinaesthetic unity (Kojima, 1998) of Serial I, Primal I and Thou. It is the natural condition which Morita waited to bring forward out of Secluded Bedrest and into nature in stage two of his therapy. It is human being and nature as a non-dual process phenomenon (*kācho fugetsu).* It is the inextricability of the individual human nature (*shizen*) from nature proper (*shizen no kokoro*), as aspects of the natural order (*shizen no honsei*), and it is entirely distinct from contemporary western conceptualisations of self and nature where the latter, seen through a Cartesian lens, is objectified and subjugated to the former.

The re-synthesis of the natural I-Thou relation is initially with nature as Thou in stage two of Morita therapy, and then with interpersonal other as Thou in stages three and four.

Morita grappled with the schism between consciousness and self-consciousness. His answer to pathologies of self-reflection was a radical reorientation of consciousness from internal, habituated, ruminative, focused on the abstract and somatic, to peripherally oriented consciousness, unfixed, extended, pervasive, free to respond naturally to the ever-changing environment. He achieved this radical re-orientation of consciousness in the Secluded Bedrest stage, channelled it into nature in stage two, and then into natural, purposed activity in the subsequent stages of therapy.

4. Nature in Morita Therapy

Nature in Morita therapy is evident as therapeutic context, therapeutic process, and in therapeutic content. Morita's core concept of 'obedience to nature' (*shizen fukuzui*) is not resigned submission *(akirame)* to one's place in the world, but a form of liberation by dropping the resisting Self, and the subsequent sinking into (manifesting as) reality as it is *(arugamama).* Nature and natural rhythms are fundamental to the Secluded Bedrest stage, and immersion in nature is fundamental to the peripherally oriented Light Activity of stage two. The experiential understandings from these early therapeutic stages are then extrapolated into the later stages of treatment toward interpersonal functioning and social reintegration. "To live naturally is to make nature an integral part of our lives and our lives an integral part of nature" (Ogawa, 2007, p. 47).

Kitanishi (2010) identifies the Zen conceptualisation of self and nature is applied in Morita therapy. This is self as an inseparable and unique manifest expression of nature, and it establishes Morita's therapeutic system as a 'returning-to' the natural order, as it is conceptualised from Zen meta-theoretical position. "Accept one's own symptom is nothing but to feel the nature in oneself as it is, which results in the deactivation of ego based on language. Such deactivation of ego leads to the change to form a new Self" (Kitanishi, 2010, p. 9). The themes of 'nature' (bird, stream, rock, tree), 'one's nature' (habituated movements of the abstract, relative-subjective Self), and nuanced variations on 'the natural', are all implicitly constant in Morita's therapeutic theorising and processes.

When Self is dropped, the relationship between self and nature becomes non-dual and the actual/absolute onto-existential mode of subjective experiencing becomes self-as-nature. The profound experiential resonance between non-theistic Zen and Morita therapy, pertaining directly to the relationship between human being and nature, is demonstrated in the following coupling:

"As I listened,
I became
the sound of rain
on the eaves"
(Dōgen)

"No skin;
no mind;
just the rain"
(Morita patient)

From a Zen perspective, Dōgen saw a "one-to-one correspondence between natural phenomena and the absolute" (Shaw, 1985, p. 121), and clearly here, the Morita therapy patient presents a lived experience of the 'thusness' of rain as a phenomenon of nature unfettered by a constructed, relative-subjective Self. In neither system is there an experiential self-as-subject in relation to rain-as-object, but in both, there is 'self-as-rainness'. This is the reconciliation of the human being and nature facilitated by Morita's natural, experiential therapy.

5. Conclusion

Morita devised a theory and process to therapeutically facilitate áskēsis, to re-synthesise a balanced kinaesthetic unity, a more natural (non-dual) relationship between authentic human nature and its natural context. By identifying that overemphasis on one's internally oriented stream of consciousness elicits, and then exacerbates pathologies of self-reflection, Morita situated the problem of anxiety with an unnatural orientation of consciousness. He employed natural context and processes to re-orient consciousness back toward its natural course.

In a profoundly Zen way, when the problem of self as impediment to direct experience of reality is resolved, the distinction between self-as-subject and nature-as-object dissolves. Nature in Morita therapy is not nature-as-object, but is instead, self-as-nature. Therefore, in contrast to therapeutic and philosophical paradigms where the relationship between the human being and nature remains but 'changes', it would be more accurate to suggest that in Morita therapy, the artificial distinction between the human being and their natural rhythms and contexts 'dissolves'. This therapeutically facilitated self-overcoming of pathologies of self-reflection, is a genuine reconciliation of human being and nature: they are neither 'one' nor 'two'; they are 'not-two'.

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John R. Mercer, PhD, therapist,
Melbourne, Australia
sosanzenji@outlook.com

Archaeological epoch as the succession of generations of evolutive subject-carrier archaeological sub-epoch

S.N. Grinchenko , Yu.L. Shchapova (Moscow/Russia)

The periodization of archaeological epoch is examined using the interdisciplinary assumptions: a) Interpretation of initial historical moments together with significant time periods within a particular archaeological epoch are revealed by the Fibonacci sequence; b) Humankind is a self-controlling hierarchical system and development consists of systemic milestones coincident with key turning point during archaeological epoch. "The subject-carrier archaeological sub-epoch", defined as an holistic virtual sequential totality of all individuals-participatants (consolidated by unified level of information complexity) of corresponding archaeological sub-epoch development/evolution process, regarded as the archaeological epoch succession of generations. The proposed synthetic (multidisciplinary) understanding of the archaeological science subject, being included in the educational context, it acquires the status of worldview

1. Introduction

The problem of chronology and periodization in Humankind history based on available archaeological data is of significant research interest. In practice, this problem depends on an accurate relative scaling of historical events and identifying main periods of evolution and development within historical time frames [Christian, 2004; Korotayev, 2006]. To achieve these goals specific research methods are widely used. Examples of such methods are the estimation of age for certain historical artifacts by physical, dendrological, comparative-archaeological and other common techniques. To extend these specific methods one can use *interdisciplinary* techniques based on fundamental laws of nature.

Firstly, a *numerical approach* allows the representation of important stages of Humankind development during particular archeological epoch by the use of reverse Fibonacci sequences.

Using such an approach and introducing the scale of “thousands of years” one can annotate chronological periods and represent them in an evolutionary perspective by constructing a Fibonacci model of archeological epochs (FMAE) [Shchapova, 2000, 2005; Chtchapova, 2003]. Secondly, an *informatics-cybernetic model* (ICM) is applied to explain the structure and evolution of Humankind. This model was developed to describe the structure and adaptive behaviour of hierarchical self-controlling (self-optimizing) systems [Grinchenko, 2004, 2006, 2007].

Let’s consider both approaches in more details and apply them to construct chronology, develop periodization and then compare the derived results.

2. “Fibonacci’s” Model of Archaeological Epoch (FMAE) chronology

We propose the *numerical model* of chronology and periodization given by the Fibonacci sequence (FS). Formally Fibonacci’s sequence is represented by the recursive relation: $F_1 = 1,\ F_2 = 1,\ F_{n+1} = F_n + F_{n-1}$, which gives the following sequence as a result: **1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, 6765, 10946, 17711, 28657,** ….

If we add to the dimension of “thousand years” to the dimensionless numbers in the sequence, then the Fibonacci sequence reproduces with an adequate accuracy the known archaeological chronology of “ages”: 1 millennium A.D. – late Iron age, 1 millennium B.C. – early Iron Age, 2 millennium B.C. – middle and late Bronze Age, 3 millennium B.C. – early Bronze Age, 5 thousand years B.C. – the beginning of the Chalcolithic, 8 thousand years B.C. – the beginning of the Neolithic, 13 thousand years B.C. – the beginning of the Mesolithic, 21 thousand years B.C. – the peak of the upper Paleolithic, and so on. Let’s consider as a “period” the time interval between two nearest numbers of the Fibonacci sequence in our currently used numerical model of historical process (which is designated in the FMAE by long dash) [Shchapova, 2005, 2011].

The creation of such a model requires accepting special measures to accommodate traditionally used time readout: “B.C.” and “A.D.”. Between corresponding members of FMAE – i.e. units – is necessary to introduce such denotation-construct as “0*”. The character “0” will be used here to symbolize the start of an appropriate period readout in the real passage of time (i.e. the figure, disposed on the left side of dash), and the sign “*” denotes the alternation of the counting direction of time at that instant (known as the change of “eras”). The introduction of this denotation-construct into the numerical FMAE makes

obvious the fact that the continuances of the two latest periods in FMAE make up one thousand years each.

If we introduce here the concept of an "*archaeological epoch*" (AE) to denote the relatively large-scale time fragment of Human evolution then within FMAE, it become possible to describe the periodization of AE in greater details by introducing the term "*archaeological sub-epoch*". Within the model sub-epochs are the overlapped sections of FS, such sections commonly consists of three terms.

In general, sub-epochs have a similar structure. Firstly, each sub-epoch consists of *the latent phase of becoming* with two periods. The first one signifies the appearance of human-carrier (*human-actor*, *human-subject* – humans related to AE) and the second one is the onset of material production. Secondly, the role of the sub-epoch is *the explicit phase of the material culture evolution* with three periods: origin, culmination and completion. And thirdly, in each sub-epoch there is *the latent phase of the involution of material culture, material production and human-carrier* within one period. Within our model each sub-epoch is a kind of macro-unit of evolutionary process in AE. The concept of sub-epoch is of significant heuristic power, as it allows comparison of functionally analogous processes related to very distant historical sections of AE.

3. Informatics-Cybernetic Model (ICM)

Structure and adaptive behavior of the Universe (in the most general sense the Natural system) – at an appropriate level of abstraction – can be described using the control theory, more precisely by means of structure and adaptive behavior of **informatics-cybernetic hierarchical mechanism** [Grinchenko, 2004, 2006, 2007, 2011]. This mechanism was first introduced and described in the works by V.F.Turchin's [1977], A.A.Lyapunov's [1980], L.A.Rastrigin's [1981], N.N.Moiseev's [1987].

The key concepts of the structure and regulatory mechanisms of Humankind evolution were formulated in the work of S.N.Grinchenko [2007]. In particular, the Humankind as a system was considered as an ensemble of consecutively appearing hierarchical optimization subsystems that are responsible for an adaptive behavior. The appearance of the new complicated subsystems does not necessarily mean the elimination of the older ones: all these subsystems simultaneously exist, co-evolving both between themselves and with the Biogeosphere. Each "system turning point" in the evolving system of Humankind includes

three fundamental components: a) intellectual-informational "turning point" on the hierarchical level of the personality/individual; b) infrastructural-communicational "turning point"; c) production-working "turning point". There are the following **turning points** in the historical development of Humankind:

0). appearance of vertebrates cephalization (and the one-tiered hierarchical system "Long-before-Humankind-0") near 440680-427850-415020 thousands years to B.C.;

1). appearance of the *pseudo*-hominids [270] *Hominoidea* (and the three-tiered hierarchical system of "pre-pre-Humankind-1") near 29080-28230-27390 thousands years to B.C;

2). appearance of using mime/gestures *quasi*-people[1] *Homo ergaster/Homo erectus* (and of five-tiered "pre-Humankind-2") near 1920-1860-1810 thousands years to B.C;

3). appearance of using speech and language *Homo sapiens* (and of seven-tiered Humankind-3) near 124,6-120,9-117,3 thousands years to B.C;

4). appearance of writing (and of nine-tiered Humankind-4) near 6.35-6.1-5.9 thousand years to B.C. (this stage in sensu strictu AE, fixes offensive of *civilizational Humankind's history* epoch; we are talking about ancient despotisms in valleys of Great Rivers (Nile, Tiger-Euphrates, Indus, Yellow River). Most of the Ecumene remained unwritten and developed within frameworks of AE. The formation of civilizational history, according to FMAE, must finish to the moment of new IT becoming);

5). creation of texts replication technology (and of eleven-tiered Humankind-5) near 1431-1446-1461 thousands years A.D.

6). creation of computer equipment (and of thirteen-tiered Humankind-6) near 1946; According to our model, it must initiate the appearing of new subject-carrier and corresponding to his social-economic structure.

7). creation of net equipment (and of fifteen-tiered Humankind-7 that for the first time emerges in the world) near 1979;

8). creation of nano-equipment (and of seventeen-tiered Humankind-8) near 1981; and so forth…

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[270] *Note*: suggested prefixes to the terms *pseudo*- and *quasi*- refer to the rudimentary level of such forms related to corresponding societies in comparison to their more developed co-forms).

Each time interval between the adjacent “system turning points” is shorter than the previous by $e^e = 15{,}15426...$ times [271]. Specifically, this regularity proposes within the frameworks of the ICM the history of Humankind system periodization: **… 28,2 millions years ago – 1,86 millions years – ~121 thousands years B.C. – ~6,1 thousands years B.C. – ~1446 year – ~1946 year – ~1979 year – ~1981 year …**

We note and emphasize, first, the semantic kinship and, can be said, the commonness of content, contributed in conceptions of "system turning points" in ICM and in concept "joint moment FMAE". Kinship and similarity of these conceptions allows to consider them as part of unified phenomenon – the formation of new ASE, in which new IT precede to appearing of all the rest originality of arising ASE (its subject, technologies – industrial and social, and cultures – material, social and spiritual). Second, we'll notice and stress: the history of four IT is being developed in a continuation of eight ASE, including composing proper AE seven, and another – ASE its prehistory. Each IT starts, would seem, the stage of its evolution (their whole four in AE), in which is involved each time two ASE: prehistory, Archaeolith, Lower, Middle and Upper Paleolith, Neolith and both metalliferous ASE – Paleo- and Neo-metals. Thus, sophistication of IT is a criterion of one more periodization of AE.

The proposed interpretation of the model’s hierarchic structures of social-technological systems and calculated values of their parameters can be considered as a “coordinate system” in “historical space-time” of Humanity *as a whole*. Such an approach reveals fundamental system properties. Thus it possible to assume that in practice the **real** values of the time-spatial characteristics of the structures and related parameters are gravitating to their **ideal** values. The *ideal* system parameters correspond to their most *energetically effective* configurations. The deviation of “real” from “ideal” in a particular parameter value, apparently, reflects the potential disturbance of this energetic effectiveness [Grinchenko, 2007]

Obvious deduction and holism in our suggestions about theme of investigation made it possible to observe and to distinguish ***"real"*** from ***" ideal"***. These words like *quid facti* and *quid juri* [Hashi, 2014, p.11], and *ματερια* and *αιδος*, as composing of Cosmos World.

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[271] This value of geometric progression denominator is related to the numerical sequence simulating the development of biological systems. Initially, this denominator of geometric progression was calculated by A.V.Zhirmunskiy and V.I.Kuzmin [1982] during a study of the critical levels in their development.

4. Integration of the modeling approaches

This story has arisen as a consequence of AE chronology and periodization numerical modeling process based by us on association of FMAE and ICM [Grinchenko, Shchapova 2010] – Fig. 1.

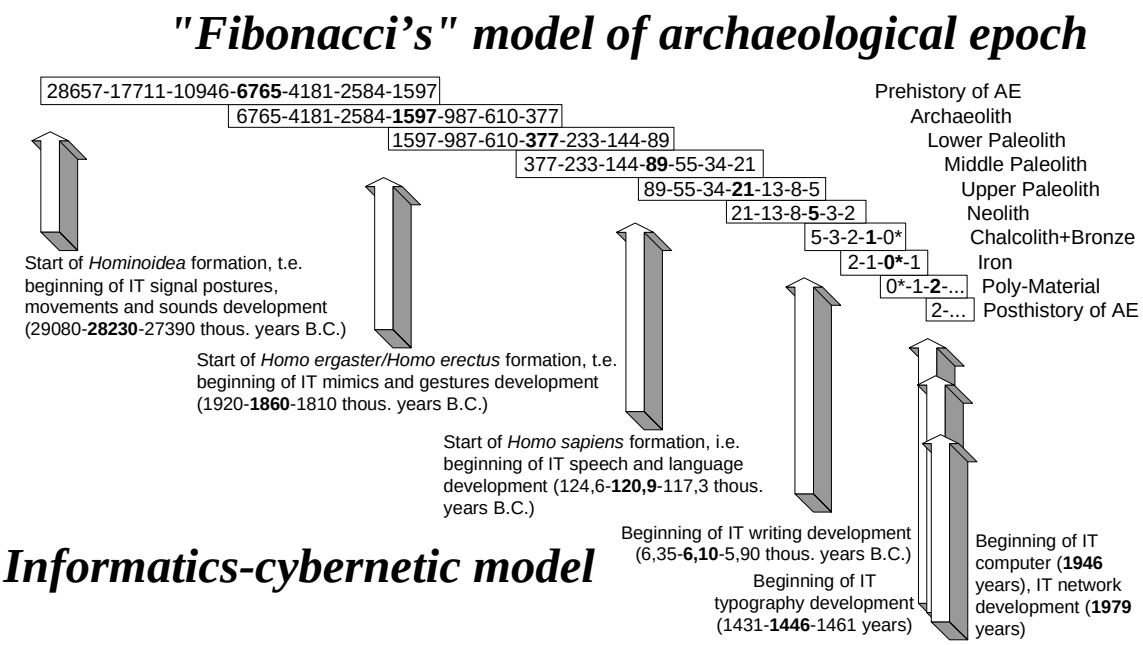

Fig. 1. Joint numerical model of the archaeological epoch chronology and periodization.

Joint numerical model, indeed, – synthesis of two models. Proper FMAE correspond 2-8 lines, which encompass all departments of Stone Age (macro-semantic scale its development) showing together that in macro-scale AE the division of Bronze and Iron Ages in departments impossibly, that the processes, which unfolded in the Metalliferous epochs – these processes of less, meso-semantic, scale in development AE.

ICM correctly verified FMAE and initiated the addition to last yet three lines, from which 1st represents Prehistory AE (mega-semantic scale its development). Two final lines – Ages of Poly-materials and Post-history of AE (micro- and nano-semantic scales its development). Most important originality of this model is continuous development of information technologies as self-development stages AE.

"The subject-carrier archaeological sub-epoch", defined as an holistic virtual sequential totality of all individuals-participatants (consolidated by unified level of information complexity) of corresponding archaeological sub-epoch development/evolution process, regarded as the archaeological epoch succession of generations. Thus, in the early stages of

evolutionary development of AE, concept of the subject-carrier of ASE is almost identical to the concept of "biological species" of corresponding complicating subject-individual: *Homo habilis*, *Homo ergaster/Homo erectus/Homo heidelbergensis*, *Homo neanderthalensis*, *Homo sapiens'* (Fig. 2). Subject-carriers ASE of Neolithic, Bronze and Iron are human beings of contemporary physical type belong, по нашему мнению, to different forms of Homo sapiens: Homo sapiens'', Homo sapi ens''', Homo sapiens''''. Indeed, they are near to *H. Sapiens* anatomically, but much more complicated for social and productive behavior, intellect, psyche and others.

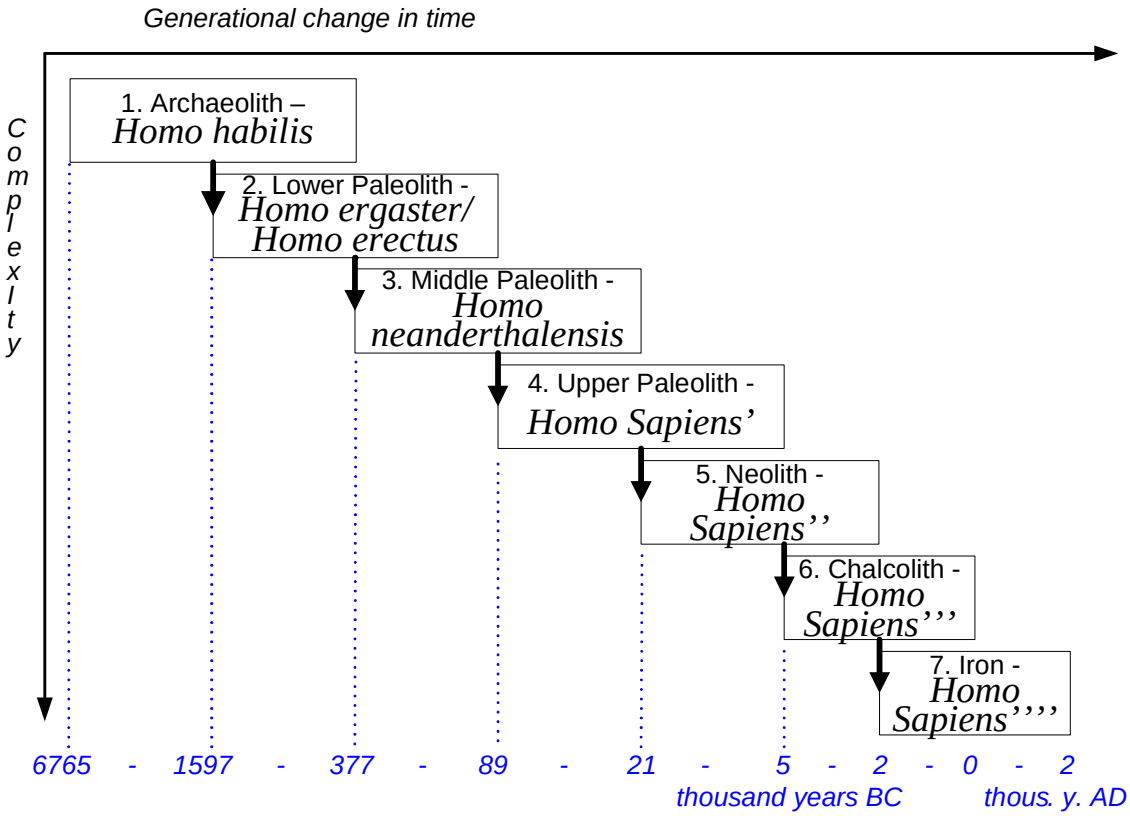

Fig. 2. Scheme of development/evolution (on a logarithmic scale, a continuous relationship of time for parent-child line).

Remarks. The top horizontal line-arrow indicates destination of time arise. At bottom horizontal line placed key moments of AE: 6765, 1597, 377, 89, 21, 5, 2 thousands of years BC to 2 thousands of years AD. The vertical line-arrow indicates destination of complexity's arise.

Joint model shows **integrity** of each ASE as structural unit of AE, their close kinship and production ties, and peculiar to changes of generations clear rhythm, which is required in mutual synchronization of ASE. Each date on the time axis in Fig. 2 is the boundary of tertium.

5. Material and ideal in AE (a little about tertiums)

The idea of tertium is inside phenomena, characterizing the ASE, beginning in that its developed form has six periods. "Joint moments" ASE underline the obviousness its halving to logarithmically identical parts (refer to fig. 1, where they are outlined by the semibold type). Still an example: ASE is divided into two phases, and the *obvious phase* involves three periods. The *latent phase* includes also three periods, of which two precede obvious, and one finishes it.

Generations of ASE subject-carriers start every time with the appearance of a new person, or entity, subject-individual, possessing high level of complexity, that is branching of the current ASE evolutionary process: continuing evolution of third of perfect in it and the appearance thirds of material in the new emerging ASE. Thus, a material created by humans – the main condition for the formation of social and spiritual components of ASE (a similar phenomenon is described in [Karban, 2015].

Typical (in general) procedure of dominants change during ASE:

a) material tertium: it is anthropogenesis – material production – material culture;

b) ideal tertium: sociality – spirituality – involution.

Set of all material tertiums specifies base trend of AE continuous development, tree.
Individual ideal tertiums discrete and act as AE/ The metaphor of "the constant of its trunk and branches of the "the variable leaves, flowers and fruit of the tree" can be described this process.

The concept of *ASE subject-carrier* of and concept of *generation* in the development/evolution of AE can be assumed identical. In the AE development/evolution replaced *seven generations* or *seven ASE subject-carriers*. Thus, the series (change) of generations of ASE subject-carriers appears as a fundamental algorithm.

6. "Overlaps" between ASE

"Overlap" in ASE subjects-carriers evolutionary development processes of Lower and Middle Paleolithic is shown in Fig. 3. This shows the moments of informational takeovers and informational revolutions [Grinchenko, 2007; Grinchenko Shchapova 2013], so important for the understanding of the interaction between the subject-carriers of neighboring ASE.

As you can see, "overlap" implement "ideal tertium" of ASE Lower Paleolithic and "material tertium" of ASE Middle Paleolithic. In other words, the descendants of relatively primitive *Homo erectus* and similar to them continue to exist – even to develop as a dominant [Grinchenko, Shchapova 2014] – its material culture and sociality after of their development branch appeared more sophisticated *Homo neanderthalensis*. Очевидно, что developing *Homo erectus* did this in parallel with the growing its evolutionary potential neanderthals. Obviously, at the stage of ASE "overlap" were possible contacts between the branches of the different *Homo*.

We also mention that the traditional "Three Age System" – the Stone, Bronze and Iron – brings together some kind of century "butt", introducing assumptions of possible "time advances"/"time delays" of some events of the archaeological reality. As part of AE "butt" connected not "ages", but to so-called "explicit phase" of ASE. "Overlap" provide AE-periods related to so-called "implicit phase" (the first two – to the becoming phase, the sixth – to involution phase).

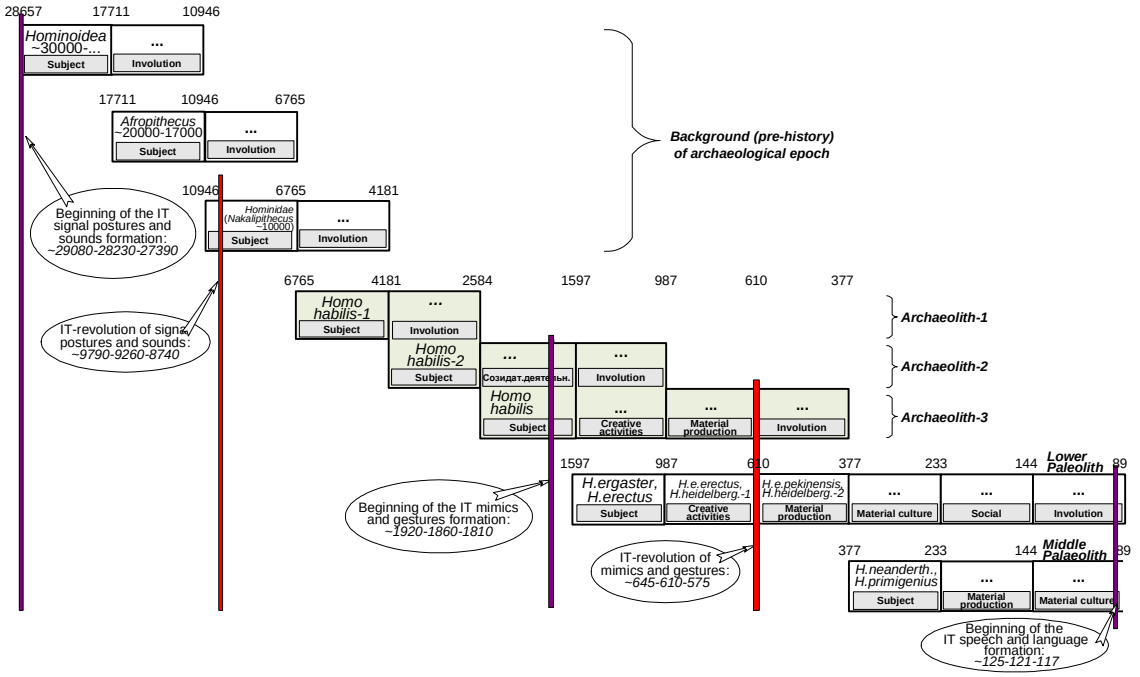

Fig. 3. Comparison of evolutionary stages of development of ancient forms of human.

The processes occurring in implicit phases, generate a small – but not zero! – number of extant artifacts. In this regard, it becomes clear the reason, why traditional "Three Age System" successfully "settle" a large part of the available information – but it does not mean all. And at the same time it becomes clear, why multidisciplinary archeology does not reject "Three Age System", but deepening and expanding the idea of AE.

An example of the first in the history of AE "overlap" of subject-carriers evolutionary development processes of the three components ASE of Archeolithic shown in Fig. 3. Complications of form in a chain *Homo habilis-1 – Homo habilis-2 – Homo habili*s led to the transition from a purely biological behavior to bio-social behavior, and then to rudiments of material production.

Following Aristotle, who argued: "... it is impossible to know on the basis of the subsequent prior to which no primary" [Aristotle, 1952, p. 184], we extrapolated the regularities we have identified in AE development on its purely biological "background" (Fig. 3). As a result, we have found: the time length of each of its components is two AE-periods, and corresponding "overlap" – one AE-period. This trend has been traced by us in earlier stages of living things development too.

7. AE as Double Helix

FMAE – model, where parallel and simultaneously at each moment of the archaeological time develop two ASE. Compete evolution of AE, set of seven ASE with prehistory, may be represented in form of a pair of "long gluings" (Fig. 4).

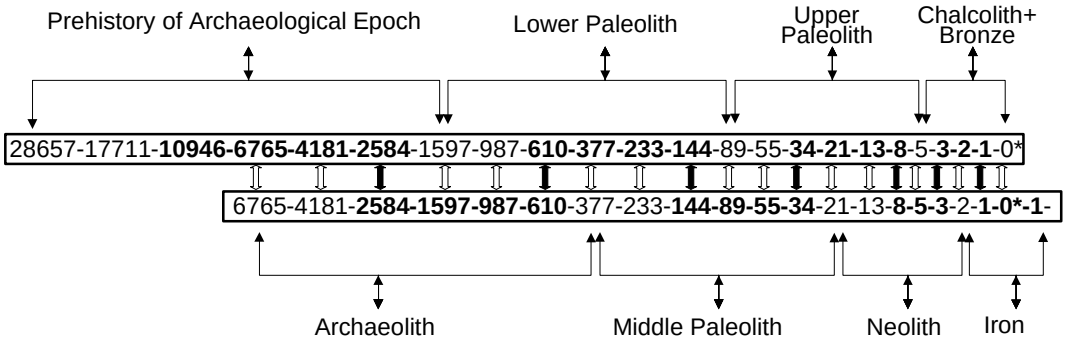

Fig. 4. A pair of "long-gluings" chronology AE.

Moreover, these "long gluings" are easy to be wrapped into a double helix around the time axis of informational and technological complexity of Human (Fig. 5). Erwin Chargaff wrote: "The outstanding charismatic symbol of our time – the spiral staircase leading, I hope, into heaven» [Chargaff, 1978: 106].

It seems that AE as a historical phenomenon is similar to the epos or ancient poem: hexameter in versification (6 periods in each ASE), tertium as half-lines of ASE, the emphasis – dactyl, anapest, amphibrach in each tertium. And that AE is one in history time when *harmony* was the main feature of law and humanity develops in a series (changing) of its subject-carrier generations.

8. Conclusion

Such our ideas about place and a role AE in general-historical process, the complexity level of which was various at all evolution and development stages of human, his IT and all types of his productions: material, social and spiritual.

Based on the above analysis it is possible to formulate the following main conclusions:

1. The interpretation of the Fibonacci numerical sequence as the set of time points, calculated in thousands years, is a detailed model allowing comparisons of results obtained using the existing empirical information about the periodization of AE and the corresponding simulation results from the informatics-cybernetic model.

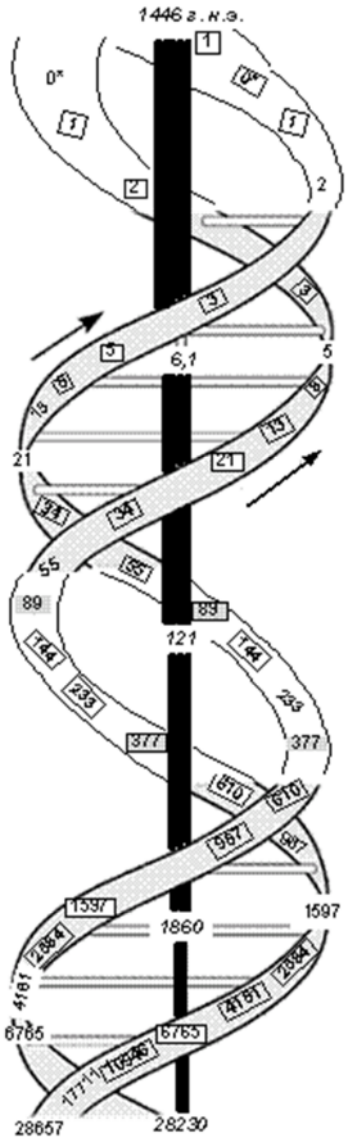

Fig. 5. Double Helix AE on a logarithmic scale of time.

2. The numerical and informatics-cybernetic models are complementary to each other. In this manner the first model explains uncertainties, produced by the second model due to the fact that the denominator of the informatics-cybernetic model is one order higher than the denominator approximating the Fibonacci's series by sequence number related to the

"golden section". In turn, the informatics-cybernetic model enhances the capabilities and time-domains for modeling initially given by Fibonacci's series. Because of this fact these models should be jointly used for the periodization of AE, to efficiently set the benchmark or key points in the estimation of major system events in AE.

3. Combining of the models ICM and FMAE makes it possible to refine the conventional data and introduce new multidisciplinary concepts in theoretical archeology. The most important of which are: a) the proposed division of AE into sub-epochs, chronologically pairwise overlapping with each other and containing latent phases (see Fig. 1); b) a statement that the material production and the ancient archaeological artifacts are a function of the archeology subject – human-creator and human-carrier histories; c) the accurate values for the previously used approximate empirical chronology.

4. By joint use of ICM and FMAE approaches and their further integration into the combined (holistic) model one can deduce the following conclusion. The evolution and development of Humankind during the AE, traditionally understood as a one-dimensional and linear process, in reality is one-dimensional but a non-linear process, related to both previous and future epochs in development of living nature and Humankind.

5. History of ASE subject-carriers generations starts every time together with the appearance of a new human/person possessed to high level of complexity. It's a natural result of the current branching ASE evolutionary process. Appearance of new entity is a new branch of evolution and beginning new ASE, as a natural result of the ASE evolutionary process.

6. First tertium of each ASE – material tertium – a part of new forming ASE. Continuing evolution of current ASE is described by ideal tertium. In this way, made by human materiality – is a main condition of ideal tertium's appearance. In processes of current evolution ASE form its social and spiritual components.

7. Overall, the proposed synthetic (multidisciplinary) understanding of the archaeological science subject, being included in the educational context, it acquires the status of worldview.

8. It is impossible not to notice of permanent contrast and orderliness of all ASE and AE as in whole structures. Discovered higher six-part standard structure ASE, dominants as internal emphasis, two tertiums, in six-stop poetical size supposing the obligatory existence of caesura, makes it possible to compare these so seemingly dissimilar essences. Such association ennobles structural feature and content AE to a level of nice harmony.

9. The main result is that landmarks of events in the historical development of Humankind can be estimated and calculated according to formal informatics-cybernetic and numerical models. Such a result reveals the direct relation between the most general stages of development in Humankind history and the fundamental laws of the Universe. This tendency can be easily observed at the highest level of generalization.

Addendum. Basic Definitions.

Archaeological epoch (AE) – the length of time during which man was formed, and an artificial habitat created by him, historical content of which is recovered by archaeological sources; is the most large-scale fragment of human evolution.

Archaeological sub-epoch (ASE) – hierarchical component of the archaeological epoch. AE includes 8 ASE: prehistory of AE, Archeolithic, Lower, Middle and Upper Paleolithic, Neolithic, Bronze Age, Iron Age.

Explicit phase of human carrier and material culture evolution – contains, in general, three periods of ASE: a third "evolution-1", fourth "Evolution 2" and fifth "Evolution 3".

"Fibonacci's" model of absolute chronology and periodization of archaeological epoch (FMAE) – is based on the reverse numerical series of Fibonacci (real name **Leonardo of Pisa**, born 1170-75, died 1240-50) – a geometric progression with the "golden section" denominator, numbers of which given dimension of the "millennium BC". One of the numerical modeling results. This model proposed by Yuliya L. Shchapova [Chtchapova, 2003; Shchapova, 2000, 2005].

Implicit phase of becoming of human carrier and material production he made– contains in general two periods of ASE: first 'becoming-1 "and second" becoming-2. "

Implicit phase of human carrier and his material culture involution – consists of a single (sixth) period of ASE "involution".

Informatics-cybernetic model (ICM) of Humanity system – description of meta-evolutional development and adaptive behavior of hierarchical basic elements of the Humanity system in terms (in the language) of systems, self-controlled with algorithms of hierarchical searching optimization of energy character target criteria. One of the successful examples of model special and temporal characteristics numerical modeling is based on Zhirmusky-Kuzmin series – geometric progression with denominator $e^e = 15{,}15426...$. This model proposed by Sergey N. Grinchenko [Grinchenko, 2007].

"Overlap" – a parallel and simultaneous occurrence of two evolutionary processes. Such overlay of processes show adjacent rungs of evolutionary ladder, overlapping each other.

Period of archaeological epoch (AE-Period) – hierarchical constituent of archeological sub-epoch and archeological epoch concepts – interval of time concluded between two neighboring numbers of "Fibonacci's" AE model.

The subject-carrier of ASE, ASE superorganism – consistent integrated virtual whole of all participating individuals (united by a single level of information complexity) of ASE development/evolution [Shchapova 2012; Grinchenko, Shchapova, 2015] – **generation** (commonality at the time of birth) in AE development/evolution.

Tertium, third – three consecutive AE-periods of FMAE: a) "material tertium" (in general from 1-st to 3-rd periods); b) "ideal tertium" (in general from 4-th to 6-th periods). Each ASE includes both tertiums. Limits of tertiums coincide with key moments in AE.

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Sergei N. Grinchenko

Institute of Informatic Problems, Federal Research Centre

"Computer Science and Control" of the Russian Academy of Sciences, Moscow, Russia

sgrinchenko@ipiran.ru

Yulia .L. Shchapova

Historical Faculty, M.V.Lomonosov Moscow State University, Russia

y_schapov@mail.ru

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