

FROM THE OBJECTIVE INFORMATION TO THE INFORMATION CREATED AND RECEIVED BY THE HUMAN BEINGS: AND WHAT DOES *INFORMATONOSIS* MEAN?

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ABSTRACT

The paper continues the philosophical treatment of information, and the first idea/in fact, the premise is that information is a *concept*, videlicet constructed in/by the human mind as a result of manifold human experiences, so of the multi-mediated contact of the consciousness with the external world to it. But this *constructed* character of concepts – here, of the concept of information – raises a problem, put in the paper as the second idea: that of the correspondence of the concept of information with the real world, or in other words, that of the objective character of information. Is there this objective character? Why and how do we arrive at this conclusion, and thus what do we mean by information?

The third idea mentioned in the paper is that in parallel with the development of sciences which have demonstrated the objective character of information in the inorganic and non-human living worlds, a vulgar dominant “philosophy” has put its mark on the modern and contemporary worldviews and mentalities: that the social information, given and received by humans, would be as “natural and inevitable” as the objective information in the non-human worlds. But, especially, the social information is – however reflective would it be – subjectively created and decided, not governed by physical laws. Nevertheless, this subjective character of information in the humans’ world does not mean that it is tantamount to moral relativity or taste judgements.

And – this is the penultimate idea – since the social information takes place in *asymmetrical power relations* subordinated to private restrictive interests, and within which those who control matter also control information, it results that the privately controlled social information produces harmful results: because the private interests subordinate all the human consequences to the *hic et nunc*/short term and focused *private* goals. The private control of Information and Communication Technologies (ICT) has led to *information bombardments* of the masses of human beings – considered only as consumers – in order to buy more and more commodities, including IT gadgets, and programmes which make their beneficiaries vulnerable and infantile.

The dominant ideology pictures the privately directed information bombardments as progress, equating them with the importance of information and the right to information. But the main feature of the information issued from the privately conducted information bombardments is its quantitative and qualitative *excess*, leading to what was called a disease produced by information, *informatonosis*. Therefore, what is important is to distinguish information from quantitative and qualitative *noise/trash*, and there are *criteria* for this: the *consequences* of information and noise/trash.

If so, the last moment of the paper is only a reminder of a “solution” given by the ancient philosophy: the concept of *measure*. This one has remained for the dominant modern and contemporary thinking a marginal and unpleasant memento. But nowadays, to keep measure seems to be a condition of persistence of both the humans and their creation, i.e. information/culture.

KEYWORDS: information, objectivity, subject-object relations, constructivism, ICT, noise, significances, measure, *informatonosis*.

Introduction as epistemology

The paper continues the philosophical – and not metaphysical² – treatment of information³, that is, firstly, the debate concerning the place of information in what we name the existence: its objective, ontically autonomous quiddity and anterior to the humans. But this ontically objective

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² Metaphysics is just the *historical* form of philosophy that supposes: the isolation of entities from their life of relations – thus not only from their environment of relations – and the speculative deduction of the characteristics of these entities in their expanse and limits; briefly, the equivalence of the concepts with the reality of these entities.

³ Ana Bazac, “Ontology of information, information theory and technology”, *Noema*, XIII, 2014, pp. 195-246.

character is united with or rather tackled in what is called, from Kant on, *constructivism*⁴: namely, in the existence things are outside us and independent from us but only *by the fact that they exist*/at this level of *simple existence*, acknowledged by us as *simple existence*; but *as they are known* by us/as they present themselves to us/as their properties are emphasized to us *they are the results of the mental processes* of man/of man's consciousness that constructs/gives the facets of the reality as we consider them. The data are *objective* in the sense that they arrive to us through the sense organs and, in the last instance, without this source of the sensible experience⁵ there is no knowledge, furniture of one's mind. But these ones/their *forms* are the result of the construction of mind⁶.

Therefore, as we must not ignore the construction of knowledge, we must never forget that this knowledge reflects an objective world. When this world is fathomed in science, the researchers know that their concepts and hypotheses are constructed – have a history and logic⁷ – but when they begin to research, they focus on and emphasise the real world they are interested about, as this one appears with the help of concepts, instruments etc.

(For example, discussing man's relation with nature, one ought *to surpass* both the view that nature as such does not exist because it is socially/culturally approached – consequently, 'people's representations about nature would be only subjective and thus, they do not matter, simply, they are not able to reveal what in fact takes place' – and the hybrid perspective of the inexistence of the peculiarity of nature and of man because of their profound mixture. Or, man and nature are inter-related, and man is who sees nature⁸ – not inversely – but they are two different systems, though intersected, and not superposed. This means that each of them has its own complexity, on which the complexity generated by man's action in nature brings new problems.

“For the problem of climate change is constituted precisely by how social relations combine with natural ones that are not of their making. Without the primacy of the totalities of nature, emitting CO2 and other greenhouse gases would present no problem. When humans decide whether to extract fossil fuels or not, subsidise the industry or not, slash emissions worldwide or not, they take decisions on the material bridge that connects them to all the factors of the earth system, which then pull off the consequences. If the bridge did not span two sides, the decisions would have no meaning”⁹.

And, we should remember that the intersection and mixture of nature and society generates a “third” system: that of this mixture).

These two aspects – the *objective* origin and the *subjective* construction of knowledge – are not separated and independent from one another, but always *mutually verify each other* through the multiform human *experience*:

a) knowledge corresponds to reality *as if* their results would be copies of this one¹⁰, and this correspondence is assured by what was called (discursive and in action) *practice*¹¹. And this is

⁴ We could not ignore a constructivist *avant la lettre*, Aristotle: who said that time is mind-dependent (*Physics*, IV, 223a), i.e. time is dependent on the reason placed in the soul, able to count the number of changes between *before* and *after*; or, in *Metaphysics*, 1053a, that “knowledge or sense perception as a measure of things for the same reason, because through them we come to know something; whereas really they are measured themselves rather than measure other things. But our experience is as though someone else measured us, and we learned our height by noticing to what extent he applied his foot-rule to us”.

⁵ “Natural”/without apparatuses or with them, the experience is always sensible.

⁶ Ana Bazac, “The construction of the scientific object and its confrontation”, *Noema*, XVI, 2017, pp. 219-240.

⁷ See Lorraine Daston (Ed.), *Biographies of Scientific Objects*, Chicago, University of Chicago Press, 2000.

⁸ In other words: man is who intends to know, who focuses on – thus, who arrives to know – the objects. Man does not know/ does not aim at knowing his own sensations, but the *objects*. He certainly arrives to know his own sensations too, but only in a secondary abstraction.

⁹ Andreas Malm, *The Progress of This Storm: Nature and Society in a Warming World*, London, Verso, 2018, p. 74.

¹⁰ This correspondence is put to the test in the situation of conjectural scientific theories; they are conjectural because they cannot be observed /experimented but, at the same time, they are not “metaphysics” because they may be

because in Kant the imagination is *both* reproductive and productive¹². Or because in Husserl there is first an *Urimpression* – the always first, primary reception of the external world through sensations, thus a passive copying which firstly distinguishes between the external world and the receiver but then/at the same time unites them in the action of reception as such – and then *the intentional* does always *focus* by taking account of the *Urimpression*. This one is the ground of intentionality. Or because there is a close connection between the modal/context dependent images and symbols created in the brain through sensations and perceptions of the external world and, on the other hand, the a-modal symbols constituted on a higher level, as the elegant formalisms representing knowledge and the knowing: therefore, the knowledge as we know it is not a direct construction of the mind, but is grounded, including in what was called “situated action”¹³.

calculated on the basis of physical concepts and mathematical developments. See the conclusion of multiple histories of the beginning of the Universe, emphasised by the top down approach (from the present to the past) that circumscribes one history according to “the question asked”, S. W. Hawking, Thomas Herzog, “Populating the Landscape: A Top Down Approach”, *Physical review D: Particles and fields*, 73(12)·February 2006, DOI: 10.1103/PhysRevD.73.123527.

¹¹ Practice is the *medium* between the mind/even the consciousness where the symbols are forged and, on the other hand, the human language. Discussing the origin of the constitution of the humans, we may presume that the practical needs were the impulses of specific gestures and sounds which were proto-languages; these ones became languages only becoming autonomous and/but serving the practical needs. The practical needs – showing to proto-humans (let say, to the *Australopithecus*) the information related to the environment, to specific targets within the environment (an animal, for example) and to their own collective possibility and means – have continued, the new stage of man was that of *homo habilis* (the “toolmaking animal”, as Franklin characterised the humans) and thus the schemes, symbols and images have been created and stratified in the mind, as well as those related to the language. (Thus, we may also understand the consciousness as a *medium* between the brain processes and the whole activity of practice. Or: the brain processes as *medium* between the external world and the consciousness. These “alternatives” – which in fact reflect only the apparently disjunctive viewpoints of researchers over time, linked to both the level of scientific cognisance and the worldview of the moment – are the faces of the same unique process and phenomenon of man as *conscious animal within its environment*). (Hegel has theorised the concept of mediation – but not concretised in this manner – and Husserl has followed him, see Tran Duc Thao, “Dialectical Logic as the General Logic of Temporalization”, in A-T. Tymieniecka (ed.), *Analecta Husserliana* Vol. XLVII, Kluwer Academic Publishers, 1995, pp.155-166).

Letting aside the process of hominisation, we may give value to practice if we understand it as material and spiritual relationship between man and the world. Its result and end, at the same time, are both the transformation of *man* in his entirety (his body, mind, values, feelings, powers) and – keep attention – the material and spiritual transformation of the *world*. One side – the material *or* the spiritual – is impossible without the other one, and thus practice must not be reduced and simplified. Its result – in phenomenological view (that has continued Kant’s constructivism) – is that “reality is that which we produce”, including its *meanings* existing only insofar as the humans make their idea building practice. Once more, practice is “a total experience”, “the existence actually lived” giving just the aggregate of meanings, a lived experience of the world giving “the life-world”/*Lebenswelt* outside which there are no man, consciousness, ideas, meanings, Tran Duc Thao, “Marxisme et phenomenology”, *Revue Internationale*, N°2, 1946, pp. 168-174.

As it is known, when sciences were not yet developed, the philosophers spoke (as Leibniz) about *forces* determining the natural processes. But how did they arrive to this concept? They certainly generalised the trivial examples of mechanics, and they have forged the philosophical abstraction starting from the consequences of a global mysterious mechanism, as absolutely independent from the human mind that has thought and thinks all of these. And – it’s interesting – once they have coined the name/this abstraction, they made it autonomous from both the mechanistic movements from close to closer and the process of thinking. Only later on, philosophy has understood the object-subject interdependence. *The process of practice is just this interdependence.*

¹² This aspect is highlighted from a phenomenological viewpoint by Michel Henry, *L’essence de la manifestation*, Paris, PUF, 1963, where the imagination, by being reflective, has a power of objectification and thus constitutes the *horizon* of the objective world; but even by this fact it is constructive, and at the same time affected by this horizon; that meaning that the constructed world by our imagination is not tantamount to the objective world but is *mediating* our relationships with the world, namely, throwing a light on both our exteriority and our inner power of imagination that gives much more than the external world.

¹³ Lawrence W. Barsalou, “Grounded Cognition”, *Annual Review of Psychology*, 59, 2008, pp. 617-664.

b) But, at the same time, reality appears as it is understood – i.e. defined; and certainly according to the patterns of thinking in different epochs.

The history of thinking shows us that – also because of the constitution of man’s biology and mind fit for its life within the mezzo-world, not in the subatomic and nor in the high macroscopic ones – first, the humans were convinced that reality *is* because it is tangible and visible. So, for them the words were only copies of things, and when they were pronounced the speakers knew/were convinced that the words stand for the things they name. To this mezzo-world has the Newtonian physics corresponded. Everything was seen and only what was seen was measured. A “structural” science has been formed, full of descriptions where the favourite verb was “is”. This physics was in accordance with an *ontology* (having an old history) that has always sought and continued to seeking for the *stable* and *unchanged* principles explaining the tangible world and giving the *identity* of things which “are”. And since the model was the visible and tangible world, the principles themselves and other philosophical abstractions were *objectified*: they “were” *as if* they would have been banal tangible things.

Following Kant, in the second half of the 19th century Marx and Engels have given arguments for a strange enough philosophy for their time: that the *concepts* are not copies of objective essences, because there are no objective entities with immutable essences, we cannot isolate the objects from the amalgam of *relations* which form these objects, and we cannot speculatively ignore the amalgam of relations – thus, neither the contradictions which are the inherent pattern of relations.

Gaston Bachelard in 1931¹⁴, Alfred Korzybski in 1933, have observed the transition from the Newtonian science (that led to reductionism/simplification¹⁵, not only necessary at the dawn of modern sciences, but also as a manifestation of the “ideological disjunction science-philosophy”¹⁶) to that imbued with the spirit of Einstein’s physics: the transition from *identification* of objects and immutable mechanisms to *processes* and *functions*, to *behaviours* which give the momentary specific existence of different forms of matter, then to the pre-eminence of *relations* which form the forms (over the old assumption of things as primordial and of absolute tangible matter), to the *forms* not as qualities of the old ontological objects, but as manifestations and effects of relations¹⁷. Even “the laws of nature are relations which are discovered between events which are actually observed, or which are *fundamentally observable*”¹⁸.

And in this constructivist science – opposed to the former, objectivist one – the words as such are no longer names of only what is tangible, thus the words do no longer represent/copy the

¹⁴ See Ana Bazac, “What does a new scientific spirit mean? Bachelard from the thirties of the last century and the science of our days”, *Noema*, XVI, 2017, pp. 47-69.

¹⁵ Actually, the Newtonian science did not lead to simplification made by the scientists as such: because, with the whole inertia of the “normal science” (Kuhn) and the shortcomings of the human psychology of scientists – science means just *to question the premises* of a theory, and in this questioning the scientific research was interested to go forward. Rather, “simplification” was a conclusion: on the one hand, made by the idealistic philosophy in its opposition against positivism – this last word with or without quotation marks – and on the other hand, thrown to the large public from an anti-science viewpoint.

¹⁶ Edgar Morin, *Introduction à la pensée complexe*, Paris, Éditions du Seuil, 1990.

¹⁷ However, favouring relations instead of something “solid” does not mean that this “solid” form does not exist. See R. Feynman, B. Leighton, M. Sands, *The Feynman Lectures on Physics: Mainly Mechanics, Radiation and Heat*, Volume I, Menlo Park, Ca., Addison-Wesley Publishing, 1963, http://www.feynmanlectures.caltech.edu/I_01.html#Ch1-S2. Only that the atoms are structures formed – inherently – as a result of inner relations.

Anyway, the “pre-eminence” of relations or the dynamic unity of structures and relations “accommodates the chicken-egg predicament”, François Diaz-Maurin, Mario Gianpietro, *Complex Systems and Energy*, 2013, DOI:10.1016/B978-0-12-409548-9.01549-9, pp. 1-21 (p. 15).

¹⁸ Alfred Korzybski, *Science and Sanity. An Introduction to Non-Aristotelian Systems and Semantics* (1933), Fifth edition with Preface by Robert P. Pula (1994), New York, Institute of General Semantics, 2000, p. 696.

“matter”, thus again the old tangible matter is only a moment of the reality of matter: the new names of different bits of matter no longer correspond to any observable structure in the mezzoworld; while the *molecules* have the features of the material they belong to (let say, water), the *atoms* no longer have them (but they have the features of the chemical elements, let say, oxygen and hydrogen), and lesser the *electrons* (“inferential entities”¹⁹) and the other subatomic particles; these ones are not merely “matter”, but *forms in movement*²⁰, or manifestations of relations: behaviours of different forces and energies in concrete conditions (therefore, having also the form of particle). We do not see the quarks etc., we measure features and relations – the results, the *meanings* and the *quantities* of these meanings are the quanta – and put them into evidence in physical theories: as symbols, and not as physical entities, but reflecting *states* of reality²¹. These states are *whole* phenomena, because we cannot measure/give unambiguously independent properties from the whole phenomenon: the image of the quantum *ontos* is depending on the observation that, at this moment, it shows the interdependence of the features and relations of reality. The ontology of the quantum world is “materialist” in the sense that the features and relations are objective and constituents of the material world of atoms. But ontology exists only because the human mind has conceived it: namely, the research of the quantum world has showed that “the independent reality can be reflected completely in the whole series of phenomena. This means in effect that we can know the independent reality itself”²².

Therefore, the perspective here is of *lucid/practical realism*: neither of naïve realism where our knowledge is simple copies of things (made by our mind), nor of subjective idealism where the things exist only as they are grasped by us, and nor of objective idealism where the things are the manifestations of a spirit anterior to them; all of these conceptions being only *historical* attempts of man to understand the world. The lucid realism is *realism* – viz. the theory of the anteriority of the world towards man – doubled with the *constructivism* that refers to the cognition of the world: in this process of ken, *fidelity towards the object* has the same importance as the *understanding* of this one, on the basis of associations etc./of the mental analysis of ideas. The ideas are the *medium term* between our consciousness and reality: of course, we refer to things, but through the ideas about them. Consequently, the lucid/practical realism fathoms *things* – thus, including the information – as both objective and subjective.

¹⁹ Ibidem.

²⁰ As we know, they were and are emphasised as excitations of quantum fields obtained by colliding them in accelerators of high energy scales and *measuring* the different properties of excitations; the measuring is possible through mathematical models applied to physics: the criterion of the application is the *quantum*, the last, indivisible quantity of the *value* of the energy of particles, and thus the measuring shows the number of quanta (actually, every physical property may be quantised, but every physical property is in specific conditions/as a result of different treatments of energies; this is the reason of their individuality, measured as discontinuity/discrete numerical values).

²¹ Size matters. See *Feynman Lectures on Physics*, Vol. I, Ch. 37, http://www.feynmanlectures.caltech.edu/I_37.html: “Because atomic behavior is so unlike ordinary experience, it is very difficult to get used to and it appears peculiar and mysterious to everyone, both to the novice and to the experienced physicist. Even the experts do not understand it the way they would like to, and it is perfectly reasonable that they should not, because all of direct, human experience and of human intuition applies to large objects. We know how large objects will act, but things on a small scale just do not act that way. So we have to learn about them in a sort of abstract or imaginative fashion and not by connection with our direct experience”. And a phenomenon on this small scale “is impossible, *absolutely* impossible, to explain in any classical way, and which has in it the heart of quantum mechanics”.

²² And: “But quantum mechanically we cannot apply all relevant abstractions together in an unambiguous way and therefore whatever we say about independent reality is only implicit in this way of using concepts...the mathematics must not be regarded as reflecting an independent quantum reality that is well defined, but rather that it constitutes in essence only knowledge about the statistics of the quantum phenomena”, David Bohm & Basil J. Hiley, *The Undivided Universe*, London, New York, Routledge, 1993, p. 17.

Actually, it is worth to mention that both concepts advanced here – that of *realism* and that of *constructivism* – belong to the *theory of knowledge/epistemology*. While those of *subjective idealism*, *objective idealism* and the unmentioned here *materialism*²³ – belong to *ontology*, meaning the philosophical research of the objective origin of the world. We insist that the two domains – ontology and epistemology – must not be superposed /confused, because they are related to each other but are not identical²⁴.

Therefore, the philosophical approach of information starts here from the highlighting of the constructed and *vague definition of information*²⁵, and consists in the discussion of the *objective character of information* and the *relationship between information and the human being*. This discussion shows how much it is necessary to be aware about the *mediation* between things and our

²³ For the *naïve* and *critical* understanding of the concept of matter, see Ana Bazac, „Materia – observații epistemologice cu prilejul aniversării modelului atomului al lui Rutherford (I)”, *Noema*, Vol. XI, 2012, pp.133-158, and „Materia: observații epistemologice cu prilejul aniversării modelului atomului al lui Rutherford (II)”, *Noema*, XI, 2013, pp. 83-114 [Matter: epistemological remarks on the occasion of the anniversary of Rutherford’s model of atom].

²⁴ It would be important to mention that Marx – whose methodology is important for our approach – was *materialist* in *ontology*, but in *epistemology* was a *constructivist* (somehow, a “transcendental idealist” à la Kant, so assuming the supposition that the ideas are the medium term between the world and our awareness of it); more precisely, in *epistemology* Marx was a *dualist*: not in Descartes’ sense – whose dualism was ontological, he speaking about two substances, *res extensa et res cogitans* as the principles of the world – but in the epistemological sense that the ideas *and* practice, interdependent, determine the cognisance about the world/constitute the mediation between the consciousness and the world; in another formula, Marx’s dualism – so, we remain in epistemology – is a lucid or *practical realism*; or, remaining in epistemology but excluding the characterisation of dualism, Marx was a *practical constructivist*: the knowledge reflects the world, but through the medium of ideas and their coherence *and* through the medium of practice. Therefore, Marx’s perspective about matter is not a naïve one, but *critical*, because the real matter and the historical concepts of matter are inter-conditioning. Concretely, two aspects take place concomitantly: 1) the concept of matter is which gives us “what matter is”, 2) and the concept of matter has difficulties when it confronts the real world, i.e. the experiments of physics; and thus the concept itself changes: according to “practice”/the multiple experiences of sciences in different strata of reality, and the multiple scientific theories.

(Once more, the above mentioned “world” from “knowledge reflects the world” does not mean that the theory of matter reflects the mezzo-world we see and touch, but even inversely, that the concept of matter may contain *non-intuitive qualities for the common experience of seeing and touching the mezzo-world*: for example, that matter is not something palpable and solid/having a palpable, unique and sure *identity* – as it is for the common intuition – but on the contrary, that matter is formed from *changing structures of relations*). Epistemologically speaking, matter is not an indefeasible “category” – the idealist transposition of the solidity of the world – but a *historical* concept: *which is not finished*.

(The analysis of this “dialectical materialism” shows us more clearer that the two domains – ontology and epistemology – must not be superposed, because they are only related to each other, but not identical. Just his epistemological “transcendental idealism” allowed Marx to forge the theory of *ideology*: about the active role of ideas in mobilising the individual conscience, and about the *construction of social ideas from the standpoint of the social position of individuals*; these ones may have social ideas reflecting their own social position, or other different social positions, but still the ideas about society reflect social positions. The concept of ideology is a concrete form of the constructivist standpoint).

²⁵ The vague definition of information is similar to the vague definition of energy. See R. Feynman, B. Leighton, M. Sands, *The Feynman Lectures on Physics: Mainly Mechanics, Radiation and Heat*, Volume I, Menlo Park, Ca., Addison-Wesley Publishing, 1963, http://www.feynmanlectures.caltech.edu/I_04.html: “It is important to realize that in physics today, we have no knowledge of what energy *is*. We do not have a picture that energy comes in little blobs of a definite amount. It is not that way. However, there are formulas for calculating some numerical quantity...It is an abstract thing in that it does not tell us the mechanism or the *reasons* for the various formulas”. On the one hand, we define energy and information according to the processes where they arise – so we define energy and information in different ways *according to the domains/problems* – and on the other hand, they *are* according to the level of understanding them in these various domains.

Remaining at this energy-information connection, we might define them (philosophically, therefore searching for general definitions) in the terms of Aristotle: energy would be the *formal* cause producing a process, and information would be the *efficient* cause.

knowledge about them: this mediation is performed by the cognitive process as such and, certainly, by the human experience or practice.

Just this awareness helps us to understand that:

- on the one hand (and in a clear constructivist pattern), we must tackle *information* as distinct from *data*, although they *are* – not only used as – synonymous; but we know that synonyms do not superpose perfectly; somehow as in computer science where information is the programme, for us information is the *meanings related to a specific entity/process*, be it an atom or a (scientific) theory; if so, the concept of *data* pertains only to the *human treatment of information*; as a result, data – which, obviously, are information – are the information subordinated to the main theory/interest manifested in the concrete *hic et nunc* intentions; data are the input and, at the same time, the information which is emphasised during the construction of the scientific theory, but which has functions of information only integrated in the frame of the main hypothesis/theory: though each part of data is meaningful, these meanings/information are “only data” for the logic of the main theory; therefore, *information is data within a context* and according to the theory/intention of the theory in this context; clearer, the *goal* in a process of intellectual elaboration is that distinguishing data from information; in the same constructivist/subjective-objective approach, data were characterised as evidence for the existence of phenomena and mostly observed but *not predicted or systematically explained by theory*, while *information is predicted and explained by scientific theories*. “Phenomena are detected through the use of data, but in most cases are not observable in any interesting sense of that term”²⁶; in other words, theory/the rational ability of man are which introduce meanings and link the data through these meanings;
- on the other hand, there is a *criterion* – and the criterion is always a construct, it belongs to epistemology – that is realised by discussing both problems (the objective character of information and the human approach of information): that of the *consequences* of information as *starting point* of the research. We always start from the consequences²⁷/our needs, when we begin to imagine and construct algorithms in order to see how information does function within the process of knowledge.

The philosophical focus on information emphasises something very interesting: that the steps to taking over information and particular models of information treatment in a domain or for a problem by other domains and for different problems – so the inter, multi and trans-disciplinary approach of the problem of information – were promoted first by philosophy; the idea of trans-disciplinary collaboration, transcending the historical – and necessary – fragmentation of domains and disciplines, has appeared in philosophy by the fact that it is interested about both the jointing of things in coherent wholes/in a coherent whole, and the manners of knowing the fragments and their jointing. The philosophical manners of knowledge are *conjectures*, but proved as plausible through logical deductions and inductions leading to *coherent theories* related to the theories from science and technology²⁸. This is the reason why the philosophical theories and the mathematical demonstrations from the scientific theories are complementary.

²⁶ James Bogen, James Woodward, “Saving the Phenomena”, *The Philosophical Review*, Vol. 97, July, 1988, pp. 303-352 (p. 305).

²⁷ Practice is the proof of this standpoint.

²⁸ This science-philosophy correspondence took place in each epoch according to the main paradigms visible in the time’s worldview. But it would be interesting to know “the proportion” of this correspondence and the coherence of “excessive” philosophical theories when they are related to the science of their time. As well as – the presence of critical philosophical theories as premises for scientific theories: because in the absence of non-conformist but more

The objective character of the information

Beyond the treatment of information as structural and phenomenological²⁹ – as measured/quantitative in ICT, and as meanings reflecting the “deep” sentience of matter (M. Drăgănescu) – nowadays we may assert that the *objective* character of information is given by the (theory about the) *mutual doubling* of matter and information.

For matter is, in Aristotle’s meaning, always substance/concrete/with constant properties, we may ask from what level of matter can we speak about substance: on the nano scales – between the materials with mass and thickness and, on the other hand, the molecular or atomic structures – there are concrete properties (thus the nano materials are substance) but size-dependent and surface volume relation dependent; also, it is unanimously recognised that the molecule is substance, even the atom is – as a smallest part of a chemical element – a “substance”, if we may name the chemical elements as substance; but what about the subatomic particles? On the other hand, matter – irrespective of its feature as substance – exists only in *movement*, this one determining the change, diversification, reactions, answers to reactions, meaning the play between stability and change; consequently, 1) everything is related to everything: all the relations, etc., but also concepts, directly and indirectly; 2) matter is a *set/system of relationships and their results, structures* existing through what they relate and at the same time transfer: in the terms known from physics (forces, field, energy etc.). But this means that the doubling of matter by³⁰ information / that *the material relationships which are implicitly informational* take place from the subatomic level onwards³¹: the

valid/the future valid philosophical theories, the other ones from the mainstream/the “excessive” ones functioning in the mainstream – and irrespective of their cultural, social and psychological functions – support rather the “normal science” (in Kuhn’s formula), but much lesser the revolutionary one.

²⁹ Gheorghe Ștefan, “Information in the Structural Phenomenology of Mihai Drăgănescu”, *Noesis*, 2013-2014, pp. 9-19.

³⁰ In fact, the doubling is mutual – till a superposition of them –.

³¹ As it was showed in Ana Bazac, 2014 (see note 3), Mihai Drăgănescu has outlined a philosophical theory (1979) about information as meanings/signals of matter, so about the unity matter-information both at the subatomic level (or sub- subatomic) and the superior levels. But objections may be raised against the statement that only at the sub-subatomic level there would be the unity matter-information (he spoke about “informatter” at this level only) and against the presupposition that at this level there would be an “infra-consciousness” producing “ortho-signals”/meanings of concrete meanings at superior levels.

Mihai Drăgănescu’s standpoint *raised a problem, of course, but at the same time, ignored it* because the author did not discuss the difference between the non-living and living matter.

Or, the problem is just this difference: in the living matter, information is and brings with it a goal orientation related to *functions*, always in new conditions, so information takes place in an indeterminist world, while the chemical interactions – specific to the inanimate world – are deterministic, thus predictable, with all the apparently exotic phenomena as the accumulation of energy in a piece of matter (Valeriu V. Jinescu, *Energy, Energonics and Thermodynamics*, București, Editura AGIR, 2016, in Romanian). Even the dissipative structures – which are structures in non-equilibrium/far from the thermodynamic equilibrium, but in a continuous such state – and where a spontaneous breaking of symmetry and the formation of complex structures are obviously due to different kinds of matter-information impacts – are *at the level of inanimate world* predictable.

(The thermodynamic equilibrium is a tenet in the classical thermodynamics as *transformations of thermal and mechanical energy under controlled conditions*, where ideal cycles are *ideal objects* (like the ideal gas, for example) which do not exist in reality, but at the same time everything may be controlled and quantitatively measured, so there are no changes of systems in time. In the 1960s, the non-equilibrium thermodynamics has been constituted on the basis of the study of *living systems* with *metabolism*, thus always transforming into new states, in fact, systems. This second phase of thermodynamics has revealed that all the living systems and, from them, all the complex systems related to society, are *dissipative structures* whose “clear boundary in space and time cannot be defined”, François-Diaz-Maurin, Mario Gianpietro, *Complex Systems and Energy*, 2013, DOI:10.1016/B978-0-12-409548-9.01549-9, pp. 1-21 (p. 6)).

In order to rapidly comprehend this difference, I quote from Ana Bazac, *The intentionality of the consciousness: from phenomenology to neurosciences and back. The attitude of Evangelhos Moutsopoulos towards the phenomenology of*

communication of information – therefore, transcending the separation of levels of reality – being possible only through this inexorable character of matter-information unity.

As it is known, for centuries the development of sciences has revealed only the *movement* of matter. Obviously, before sciences philosophy was and, in the most part, it was interested about the origin of movement and responded, first, by idealist assumptions³², and then, continuing and “secularising” these assumptions, by *forces* (and, later, with the development of sciences, by *energy*). However, these forces and energy did only directly explain why – but only how – do they exist and mobilise the matter: that acts as intertwined and implied factors in the frame of relations³³. Then, the information sciences tried to demonstrate and unfold only the information (while some philosophers have thought that ‘finally, here is the active element, that which would be tantamount to the *primum movens*’). But today one has arrived to the stage when science is more and more motivated to understand and model the *matter-information relationships*: for the sake of this problem as such and also because the processing of every form of existence/every entity offers ideas and models for the treatment of the others. Forasmuch the sciences develop in proportion as and according to the new questions soliciting them, in present there still is a gap between the

the consciousness, afterword to the Romanian translation of E. Moutsopoulos, *La conscience intentionnée* (2016), as: E. Moutsopoulos, *Conștiința intenționată*, Traducere din limba franceză, notă asupra traducerii, note și postfață despre *The intentionality of the consciousness: from phenomenology to neurosciences and back. The attitude of Evangelos Moutsopoulos towards the phenomenology of the consciousness / Intenționalitatea conștiinței: de la fenomenologie la neuroștiințe și înapoi. Atitudinea lui Evangelos Moutsopoulos față de fenomenologia conștiinței* de Ana Bazac, București, Omonia, 2017, pp. 141-142: “In contrast, the biochemical relations suppose something more than chemical determinism, a qualitative new level of existence, that when there are *functions* (and not only physical forces and energy) and “*ends*” to assure the functioning of the systems based on functions; and thus, when *information* and its transfer and clash are used for those functions and ends;

this level of existence, *life*, occurs when the *information* related to energy and energy imbalance/lack in a defined situation realises “the ‘rectification’ of microscopic fluctuations” in order to arrive to free/optimal energy, i.e. when this information “is ‘inherently’ reproducible and thus able to start an unlimited process of adaptation towards optimum function”, or information is a “replicative or metabolic machinery” (Manfred Eigen, *From Strange Simplicity to Complex Familiarity: A Treatise on Matter, Information, Life and Thought*, Oxford, Oxford University Press, 2013, pp. 231-234, 494, 575); in its turn, information – meaning “semantic information” or *meaning* – is the result of the movements of matter in discrete information space (where these movements means a change of meaning), and where matter manifests as differentials of energy/potential gradients in order to both *transmit* to other matter recipients clouds of possible situations so as these recipients/rather some possible situations to last and to *receive* from the inputs of potential gradients selective functions so as these recipients/rather some possible situations to last;

therefore, information means that a process of *goal-directed activity* is in course of establishing, that this process allows and generates the transition from chemical to biological, and that “in the biological the target structure is initially indeterminate and only takes shape during the evolutionary process”, when many reproductions and errors in the reproductions of the possible situations occur (and just these reproductions/copies arriving in different points of the information space assure their reception and, ultimately, their selection). Thus, the “conditional readiness” of biological structures is forged, and the meaningful informational process does not take place if both its two extremities do not exist. More: just because of the many possible situations and the complexification of biological structures, the informational process which aims at the simplest ways to match the states of energy with the material structures, becomes more and more complex because this process comes in biological/living structures, (*op. cit.*, pp. 437, 404, 438, 446, 405, 443)”.

2) Therefore, even though information – as a “brick” of existence together with matter – emphasises the aspect of *continuity* of non-living and living matter, at the same time it emphasises the other aspect, that of *discontinuity* (therefore, the dialectics of continuity and discontinuity). If so, the simple existence of information at a deep subatomic level is not the proof that the matter-information unity would lay only at this level; and lesser is it the proof of the consciousness of the subatomic level. Mihai Drăgănescu equates the characteristic of information to being a *signal* with *consciousness*, which is incorrect.

³² Because the basis of the world has appeared as solid, palpable, visible, “anything else was some kind of ‘spirit’”, Korzybski, p. 685.

³³ The main aspect of relations here is that of *transitivity*.

problem of matter-information relationships as their first rank reason of research and, on the other hand, the insufficient means (theories, concepts, the mathematical apparatus) to solve this problem. A “new science”³⁴ would be necessary, because only this one would describe and demonstrate the relationships and may predict their development: philosophy tries only conjectural predictions, although logical but not demonstrated.

Anyway, today it is more and more clear that the separate treatment of matter and information, as if they would be autonomous to each other, though possible and fruitful for a while, becomes insufficient. And the *matter-information unity* is the basis of the *subject-object unity*: this conclusion was suggested by philosophy through its constructivism and to this conclusion has science arrived; Kant and Einstein may well be the emblems of the new stage of science-philosophy integration.

Addendum to the problem of the objective character of information

In order to better understand the place of information in the existence, we may discern between the inorganic world – *deterministic* – and the living world, *probabilistically determinist*. In the former, information is “from the standpoint of the sender”, namely it is the form of manifestation of matter’s reality. The matter signals its presence and thus imposes the best ways to persist as relations in movement. We are those who emphasise the laws of this persistence³⁵, and only for us, who imagine abstractions, the information signalled by matter would be divided (M. Drăgănescu) in concrete information and ortho/information of information. In fact, in the inorganic world, the signals of matter generate³⁶ an in-formed matter, structured in forms, shapes, configurations which repeat themselves according as the movement of matter and information generates and follows the same *simplest* ways to persist/continue. The existence of only physical and chemical laws is the proof of “simplicity”, repeatability and predictability which are specific to deterministic systems. Or inversely, the inorganic systems’ matter-information unity have only physical and chemical impulses and relationships and may be understood only with physics and chemistry which demonstrate the simplicity, repeatability and predictability which are specific to deterministic systems. Even the complex dissipative structures³⁷ may be differentiated according to their composition and proportion of inorganic and living features, and since the inorganic and living systems coexist, the complexity of systems composed of these two types of systems is the result of the “interpretation” of the big, complex systems by the living components: the forms, plans, designs of the whole and within the whole reflect also new types of information which impose the simplicity fit for (different) living systems but that may disarrange the inorganic simplicity. We have thus new schemes of explanation where the laws are multiplying.

³⁴ See *After twenty years from the beginning of membrane calculus – dialogue with Acad. Gheorghe Păun*, http://www.academiaromana.ro/mediaAR/interv2018/int2018-0222-GhPaun/pag_media_interviuri_acad_2018_0222GhP_text.htm (in Romanian).

³⁵ As, for example, the constructal law of Adrian Bejan (1996), see *The Physics of Life: The Evolution of Everything*, New York, St. Martin’s Press, 2016, explaining the physical law of the evolution of apparent forms of material systems, configured so as to be easier permeated by energy fluxes and at the same time to better resist in front of these fluxes.

³⁶ The quantum world may be the model for the inorganic one: “each electron has its own quantum field”, “the quantum field contains information” (i.e. removing indeterminacy/the meaning of different states and putting order, concretely, generating “new properties of matter”), “given that the particle is always accompanied by its quantum field, we may say that the system of particle plus field is causally determined”, “the basic idea of active information is that a form having very little energy enters into and directs a much greater energy”, David Bohm & Basil J. Hiley, *The Undivided Universe*, pp. 30, 32, 35.

³⁷ Those which loose energy in order to acquire their thermal equilibrium, but by loosing energy they produce disorder/entropy in the environment. The living systems are dissipative, but there are dissipative systems constituted from both inorganic and organic matter.

Therefore, the complexity related to the *living* world and then to the humans involves a *probabilistic determinism*, the coexistence of *n* causes *specific to different levels of reality* and emphasising the information as rather answer disturbing the simplicity and repeatability of the inorganic world. Thus, information in the living systems is rather “from the standpoint of the receiver”: already the sent information is *goal-oriented*, but the reception and then the new information arisen from and made by the changed form of the state of systems are much more goal-oriented, related to this changed form.

Actually, there is a huge difference between the non-human goal-oriented systems³⁸/ biological subsystems within man and, on the other hand, the system of the *human being*. This one is not only a system of subsystems seeking to surviving – or having what from old was called *conatus*/the conative force to persist³⁹ – but also, or even first and foremost, a system directed from its highest level of existence: the spiritual one, giving *reasons to be* of the human actions and *reasons to functioning* of, at least for a while, some of the functions constituting the subsystems: this *conatus* is, ultimately, what Aristotle called the fourth cause, *telos*, the *what for*⁴⁰. Just and only the *integrative, moral* and, thus, superior reasons to be of the system of man give the *human* quality of the information mobilising this system. And only these integrative, moral and, thus, superior reasons to be transform the humans from living beings organised according to natural laws in living

³⁸ See Hannah Ginsborg, “Two Kinds of Mechanical Inexplicability in Kant and Aristotle”, *Journal of the History of Philosophy*, vol. 42, no. 1, 2004, pp. 33-65: both philosophers have shown the difference between the non-living and the living beings; both have found that the inner tendency to be (and in a specific form) of the living beings is something new and inexplicable in the terms of mechanical laws regulating the inorganic world; the *molecular biology* developed in the last decades shows that, though the living beings are formed by the same structures as the inorganic world (atoms, molecules, chemical elements) because the living has developed from inanimate matter, in fact this occurred in accidental conditions which furnished the possibility of some structures to replicate/to behave in a qualitatively new way; but this randomness of conditions has not been considered by Aristotle and Kant who, nevertheless, have stated the natural character of life, not created by divinity, and its peculiarity explained as an inner force.

This consideration of the randomness and the demonstration of the favourable conditions for life belong to biology (natural selection theory) and molecular biology which do not demonstrate the falsity of the teleological philosophical principle, but which explains life as a result of the above-mentioned conditions. From an epistemological standpoint, we may observe the transition from a correct philosophical principle – because it emphasised the difference between the non-living and the living – to scientific theories (in the making) demonstrating the banal “mechanical” behaviour of molecules in the living, thus the validity of the principle of “mechanism”, but explaining life as a meeting between this principle and the favourable conditions.

See also Jacques Monod, *Chance and Necessity: An Essay on the Natural Philosophy of Modern Biology* (1970), New York, Alfred A. Knopf, 1971, where the (molecular) composition/structure, formation and reactions of proteins reflecting the *functionality* (the *suitability of elements in the bio-chemical reactions*, therefore the whole is an “epigenetic process”) in all of these relations, though the origin of proteins was random, explain “the mechanism” of this entire formation. The explanation is, in fact, multi-level (thermodynamic, chemical, biological and informational). For example, the *informational* content of a folded upon itself protein (having the most compact structure, generated by the sequences of amino acids in the chain, only this structure allowing the function of transmission of invariance from parents to the offspring) is much bigger than the information carried by the sequence of amino acids: because, on the one hand, the genetic information from a sequence of amino acid depends on its initial conditions, and this information is transmitted to the globular/folded upon itself protein, assuring the invariance; on the other hand, a sequence of amino acid does not dictate the next sequence (this is the chance): this one may be of any kind, let say a sequence with information from a great grandfather from the father, or from a sister of the mother; therefore, the informational content of the protein transmits invariant features, but mixed with other different features so as the child is both an offspring, having a family print, and a new unique individual.

³⁹ The conative force is more and more decoded by science. But the phenomena – for example, that of pain – appear *as if* they would be the result of a mysterious *conatus*.

⁴⁰ See Ana Bazac, “The philosophy of the *raison d’être*: Aristotle’s *telos* and Kant’s categorical imperative”, *Biocosmology – Neo-Aristotelism*, Vol. 6, No. 2, 2016, pp. 286-304.

beings organised by both natural laws and social conditioning: and allowing to each human to be an individual, a *person*⁴¹, a distinct but integrated member of the human community.

And finally, the human *telos* strongly influencing the behaviour of human subsystems manifests through the ability to find/to create *significances* of the data/information received by men in their change of matter, energy and information with their environment. But these significances are new information: without which the humans cannot exist; and because if there are no humans to give significances to the real information in the environment, this information simply does not exist.

Passing again to the scientific knowledge, we must notice that the molecular biology shows that behind the mysterious force of *conatus* is a system/"mechanism" acting according to causes/cause-effect control⁴². Obviously, the research is not finished, but if philosophy understands that it must not being parallel to sciences, it must remind the *conatus* and *telos* only as *historical* (philosophical) solutions and, certainly, full of suggestions⁴³. In the same respect, the fact that even *contemporary* philosophies ignore the "mechanistic" explanation of *functions* and substitute them with the "fundamental consciousness" should be treated rather from the standpoint of the historical – thus, including ideological – conditions which allowed this intellectual attitude.

The system of matter-energy-information

Related to the objective character of information, we may outline the common functioning of matter-energy-information in the constitution of the real world: in our universe. Why are the three elements inter-related? In a *philosophical* approach, we start from the philosophical supposition – supported by scientific demonstrations – of the original principle of *matter in movement*. What does matter in movement mean?

First, it means that matter exists/persists through its *self-organisation*. Self-organisation is the first form/principle of matter in movement. In fact, matter is a *concept* that refers to a *system of relations*: forces, forms (as particles and waves, as energy and fields, as radiation), structures, architectures, as all of these have constituted and developed in the Universe. Sciences have discovered the system of matter and have demonstrated the laws occurring in this system. Concretely, the researches have shown the relations occurring in movement: of contiguity and connectivity⁴⁴, of fit/pairing⁴⁵, of misfit/contrast. These types of relations have generated the first combination of protons and neutrons 3 minutes after Big Bang, and the transformation of particles in waves and vice-versa, and the huge multiplication/repetition of relations. As a result of this incessant repetition, we may observe the *order* in the Universe: visible/predictable, as the well-known physical and chemical *laws* discovered by scientists show.

At the same time, matter has an *informational* feature: we may treat information autonomously – for example, in ICT – but information is only a *characteristic* of matter (as, in fact,

⁴¹ See Ana Bazac, "Aristotle, the Names of Vices and Virtues: What Is the Criterion of Quantitative Evaluation of the Moral Behaviour?", *Dialogue and Universalism*, Volume 27, Issue 4, 2017, pp. 175-188.

⁴² See for example, the intracellular and extra cellular control systems, the molecular mechanisms of transport of matter in the cell, the function of information/communication of special pieces of matter (proteins, enzymes), thus the control and immune systems, Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter, *Molecular Biology of the Cell* (1989), 4th edition, New York, Garland Science, 2002.

⁴³ See also Harald Wallach, Nikolaus von Stillfried, Hartmann Römer, "Pre-established Harmony Revisited: Generalized Entanglement is a Modern Version of Pre-established Harmony", *E-Logos*, 7, 2009, pp. 1-30.

⁴⁴ See the covalent bond.

⁴⁵ See the constitution of valence, the ability of atoms to combine with other ones and thus, to gain or loss electrons in order to attain the level of energy giving more stability to atoms.

energy is): and always needs a material bearer⁴⁶ at both its starting and ending points/as emitter and receiver⁴⁷. Through this feature, matter entered both in contiguous relations and “non-local” ones: because information is “sensitive” to time, it is “responsible” for the “memory” of past events/relations and thus, of the next ones. Thus, the result of the involvement of information in the material movements and transformations is not only the repeatability as such of these movements and transformations, but also the “prediction”⁴⁸ of distant future events, just as a consequence of the repeatability: the in-formed matter entering in short term changes which – in peculiar conditions – may continue on long term.

If self-organisation means order⁴⁹ and repeatability (thus, laws), the problem of randomness emphasises another principle of the matter in movement: the *complication (and then, complexification)*. Complication describes the *quantitative* multiplication⁵⁰ of relations, space and time, and thus, the *randomness* appearing from the always new conditions of the movement of matter. In this process, the apparition of life is logical. I insisted on the quantitative aspect of multiplications of relations because matter and its energy and informational faces manifest – starting from the contiguity from the movements – in *simple*⁵¹ ways, this meaning with the lesser loss of energy and with the most stable material configurations: the “switch” (see the jumping of electrons from an orbit to another; or ionization), “pawls” (as gravitation, electromagnetism and the other two fundamental forces; or life; all of them acting as thresholds, so generating big bifurcations following which the matter can no longer ignore the routes rig out by those phenomena⁵²), and “gates” (as the symport/antiport in the cell membrane, i.e. the proteins forming trans-membrane channels allowing or not the passage of molecules⁵³), or “piers” and “dams”, or the “trees” (taken over by mathematics and computing) are very “simple” means/”findings” of the matter in movement. Only the results are *complicated*, being generated as a multiplication of relations in new

⁴⁶ We may remember the *catalysts*, substances intervening in chemical reactions, speeding them – by forming intermediate reactions requiring less energy – but not being parts of the main reactions. This function of speeding/facilitating the chemical reactions has always material bearers. The intervention of catalysts/the function of catalysis itself have appeared on the basis of contiguity throughout the relations occurred in always changing conditions.

But see also the information in living systems, carried by the *hormones*: both inside the system, from a point to another, and outside it. Hormones are the signals used by plants, for example, in order to communicate with their environment. Obviously, the inorganic matter does not react to plant hormones, but other plants from the same species do (as well as some animals). The well-known proverb “rotten apple spoils the barrel” describes a real fact: the ripen apple emit ethylene in the air *as if* it would communicate to the other apples that it is time to ripen. (But internally, it produces ethylene when the fruit is removed from the apple tree, as the signal that the fruit is in the phase when it must assure the future germination of seeds; and also the ripen apple produces ethylene that transforms the starch into sugar in order to attract the animals which will disperse the seeds).

⁴⁷ The relations of contiguity, fitting, and contrasting generates signals – *weak*, as warnings related to the state of things or to the change, or *strong*, as accompanying the relations as such along their unfolding –.

⁴⁸ This conclusion has appeared only late, only in the quantum physics, but through the form of the measurements of distant – in space and time – events (transformations of particles, particle-wave transformations), so when time has become a mathematical variable and coefficient. Obviously, all of these constitute rapid philosophical conclusions on the basis of scientific researches related to quantum mechanics.

⁴⁹ The concept of natural order does not mean an abstract exclusion of contradictions (I use philosophical words, isn’t not?) and relations, but on the contrary, it is forged in the frame of and towards these contradictions and relations.

⁵⁰ The Latin root, *complicare*, means just – as a result of the addition of too much elements (making the understanding more difficult) – to wrap, to bend, to gather.

⁵¹ Obviously, the simple is – letting aside its human necessity and conceiving of – from a standpoint, very complicated, even complex, and from another, inside the complexity of the system.

⁵² But these phenomena as such (the forces, life) are the result of the *ab initio* immensity that meant/endowed the matter with space and time.

⁵³ See Gheorghe Păun, “Some Wonders of a Bio-Computer-Scientist”, *Bulletin of the International Membrane Computing Society*, 2016, <http://membranecomputing.net/IMCSBulletin/> pp. 241-260.

conditions, thus as the *repetition* of combinations in the always new conditions; but also as *new* combinations as answers to the new conditions.

We may differentiate between *complication* and *complexification*⁵⁴.

The first corresponds rather to the inorganic matter, where the systems are rather “*closed*” (the external changing contexts do not matter, thus the cause-effect pattern does not change) and may be decomposed into smaller parts without the changing of the behaviour of the systems/the understanding of these systems depends just on this decomposition⁵⁵ and is *structural*⁵⁶, while information, as sending and answering signal, is specific to the *adaptation* of parts – and only from this to the adaptation of systems – to the external conditions; thus, information behaves mechanically, in a linear cause-effect causality that shows only the relation between the structures constituted at this level and adaptation to the external world; the decomposition may take place without the loss of information. Speaking from an epistemological standpoint, the systems are *deterministic*.

The second describes processes occurred rather in the living world (including the social one) where the systems are *open* in such a way that *they depend on the external conditions in realising their thermodynamic equilibrium*⁵⁷, and thus being able to spontaneous/creative answers) and cannot be reduced to their parts unless they disappear/transform in something very different; it is already clear that there is no uni-linear causality; besides the laws governing their constituents, the complex systems as wholes have also their *propensities*, emphasised by the *functional analysis*⁵⁸: only the *integrative* force of the systems, namely only their *functions* allow the preservation of information inside them; the ordered, algorithmic manifestation of the information in these systems does not hinder the creative communication and answers fuelled by this information; the system adapt through the adaptation of its constituents, but there are also the adaptation of the system as such, thus the functions related to this specific adaptation; in this way, all the subsistence/persistence reactions – carried by in-formed matter and energy – are subordinated to the system; the causality emphasised by the in-formed matter is complex: linear cause-effect at lower levels, but also subordination of this causality to the entire system/organism: as a result, there are also transversal causality (bottom up, top down, feedback, feedforward (from the desired persistence/from the future probable occurrences to the present re-organising of functions)), thus the

⁵⁴ In Latin, *complexus* means the action of comprising, embracing, enfolding, a group, a blending (where there would be both sympathy and close fight (*complexus armorum*)).

⁵⁵ Roberto Poli, “A Note on the Difference between Complicated and Complex Systems”, *Cadmus*, Volume 2, Issue 1, 2013, pp. 142-147.

⁵⁶ Ibidem: “physics deals with complicated systems, not with complex ones”.

⁵⁷ All the natural systems on the Earth – and the Earth as such – are more or less open. The difference – showing the *interval* between “more” or “less” – is between *thermodynamic equilibrium systems* and *systems far from this equilibrium*. The former are those which do not depend on the exchange of matter and energy with the environment, thus are stable and rigid, with a permanence determined by the *inner* properties. They may transit from a solid, liquid or gaseous phase to another. Thermodynamically, they have an internal order/near thermal equilibrium, such that they have very little free energy (not needed in the internal movement of particles) to dissipate. Therefore, they do not “intervene” in the milieu/do not produce disorder. A piece of metal in a “neutral” temperature may be an example. But this piece of metal may be put in the furnace: it receives a big amount of energy which it may disperse when it is put in a cold environment etc., thus it becomes an example for a system far from equilibrium.

The most specific systems far from the thermodynamic equilibrium are the living ones. They depend on the exchange of matter and energy with the environment, thus they always produce entropy/disorder in this environment: therefore, they contribute to the creation of changing conditions. But the living systems have their own peculiar stability, just in these changing conditions. Their entropy production overflowed outside – actually, this production of disorder outside them is the continuation of production of order inside them – is the condition to keep their internal order. Their stability depends just on a kind of balance between the received and expulsed energy.

⁵⁸ This subordination of all the parts to the entire system allows the causality proper to the system, the *conatus* of the system and, at the level of man, the *telos*.

creation of structures by the information related to functions; the system's causality appears as its *conatus/telos* (final cause in Aristotle's term), and thus the system learns and self-transforms. From an epistemological viewpoint, the open systems are *probabilistically deterministic*.

Therefore, in the new conditions, the tendency of matter to self-organise does continue, thus the order. The difference between order and disorder in different systems – which are always within another system – is another aspect of complexification, generating also new conditions for the matter in movement in the newest forms.

For example, the living matter – or the organism and almost each of its parts, including the genome from the cell, and the mitochondrion – is dependent on the external energy of various types, and “also” on matter, being organised in such a way as to being able to use, thus to process, this external energy and matter. The informational feature of living matter means just the signalling of *various external conditions* and of *internal organisation* aiming at the realisation of the functions fit for the external conditions. The result is a *new* order, or the organism – but also its parts, till the cells – succeeding to control and balance the constitutive processes.

When, because of external causes, the order is jolted, highly dissipative structures do appear (a persistent disorder/loss of energy through the form of new, “inimical” structures raised from the original ones). This means that matter “extricates itself” and *re-forms*. The new form of living matter is called *neo-plastic*: meaning the peculiarity of matter to transform. But, neoplasm is opposed to complexification, because however it is a new organisation (of the cell and organs, and finally of the entire organism), it is a “parasite” of the former sane organism and lives until this host organism lives.

The two tendencies – self-organisation and complexification (via complication) – intertwine: the systems tend to re-balance in the always new conditions. Information “participates” in this complex process of re-balancing. In the living systems, when the organism confronts disequilibrium, signals from different sub-systems arrive to the totalizing system of the sentience of the organism as pain/general state of discomfort. So, the *inside* information signals some internal material-energetic-informational non-beneficial conditions and changes. In the same way, for man the *external* material-energetic-informational conditions may be harmful; this fact is transmitted as *diffuse* information/“informational atmosphere” – towards which people react in different ways (they understand in different degrees the warnings) – and *targeted* information (in mass media), even if mostly in perverted forms, towards which people do not react.

The epistemological frame of the objective information

The human *subject-external environment/object* relationship gives the philosophical frame of our discussion about information. This relationship shows that the concept preceding that of information was *cognisance*: how can we *conceive* them, *transmit* and arrive to their good *reception*: and for what purpose. The ancient aesthetics – Plato despising the stories and poetry insinuating in the listeners, feelings and ideas opposed to the model of submissive and aligned citizens; Aristotle emphasising the dialectics of convincing texts – has erected a system of practical ideas related to the use of cognisance in the frame of *power asymmetry*.

In the 20th century, the sciences and technologies have pursued the problem of material and immaterial transmission of the cognisance (in sounds and images) – the well-known ICT (Information and Communication Technologies) – concomitantly with the sciences and philosophy of language. In order to control the elements of this problem, the researchers have interpreted the

cognisance as immaterial (as *information*), but measurable: mathematically⁵⁹. As a result, *the concept of information has become as abstract as that of matter*. In the development of this interpretation, two opposed theories have quarrelled: according to the tradition of Newtonian physics, the physical concepts were essential, the mathematical forms being only instruments for the former; in the ITC, the mathematical forms were more important than the physical laws – because they are those giving the essence of phenomena –. But certainly, these two conceptions were extreme: actually, both realise the infinity of the whole⁶⁰. For us, this conclusion is comforting: it emphasises both the integrated treatment, transcending the historical extreme views, and the ontological importance (as “principles”) of *both* the mathematical objects and relations and the physical objects and relations.

Anyway, to the end of the 20th century, the quantum physics and its philosophy⁶¹ have demonstrated that information is objective: an *active* doubling of matter at all the levels. In parallel, a vulgar dominant “philosophy” has developed stating that the given and received social information would be as objective, natural and inevitable as the information in the inorganic world. This “philosophy” ignores that while this information in the inorganic world is controlled by natural laws, the social information involves conscious senders and receivers and thus, the control is conscious: but, in order to be beneficial, it must be done by all the parts of the communication processes. If this condition is not met, the social control is deficient.

Therefore, we may show the development of information from the objective level of reality to the subjective one: from information as *signal* to information as “*semantic reaction*”/ human evaluation of meanings (Korzybski), supported by the “*consciousness of abstracting*” (Korzybski as follower of Hegel).

Briefly, for humans information exists if they *interpret* it, or give *significances* to the surroundings phenomena and facts. *When there are no significances, there is no information, but only noise*⁶².

Information and knowledge

For the present man, information is the result or the translation of the sophisticated theory of information into the aggregate of cognisance he possesses/arrives to possess. A well-known cliché is “information = knowledge; the development of IT industries = the rise of knowledge =

⁵⁹ Mathematics as both generator of precision, thus of existence/scientifically accredited existence, and as a means to cover the facts: this ambivalence must be noted.

However, what is important here is that the mathematical treatment of things starts from very simple suppositions (from this reasons do axioms exist), in order to being applicable: actually, to quantitatively expressing the quality of things; even of those non-observable, as the subatomic ones, which otherwise would have not been discovered. Consequently, the manipulation of quantities is really “the truth”: that brackets the qualities, but not ignores them.

⁶⁰ David Bohm & Basil J. Hiley, *The Undivided Universe*, p. 320.

⁶¹ *Ibidem*, p. 35-36.

⁶² Concerning this conclusion, we must not forget that information is tackled here as subjective information analysed at the level of the human “mezzo” world. Only in this world (studied by the classical Galilei-Newton science), there are *significances* processed and created by the human mind according to concrete references/context. In the mathematical treatment of information (Shannon and Weaver 1949, after Shannon 1948), this one is not semantic, but “selective”, i.e. the result and measure of the statistical calculus of the probabilities of associated states, and of the fitting/pairing of the elements of information and of control, in order to emphasise the efficiency of (and the probability of) selection in a code. The selective information has its origin in thermodynamics and means order and organisation, opposed to disorder/entropy: thus, it may be calculated and this calculus of the quantity of information is autonomous to the concrete meanings.

At the level of selective information, the noise is when it perturbs the channelling of information in the process of communication (Shannon 1948).

optimization of technologies based on the paradigm of quantity/accumulation of quantity”. Thus, if one adds more information, does this mean knowledge?

Knowledge is to *understanding*, or *significances* realised through *relating* the things/information; only the information which may be related means/leads to cognisance. We feel better/are calmer when entering in known/familiar systems of information: because we understand easier the significances of the new information, by comparing them with the knowledge already acquired. For this reason, information is not automatically knowledge; the simple adding of more information does not mean “knowledge society”. Knowledge does not reduce to bits, but it means cognisance helping conscious intentional activities with beneficial goals, so more rational and anticipative.

Information is always followed by actions congruent with the initial information: thus, as the actions are not neutral and they are evaluated, as the information they are based on are not neutral and must be assessed. More information does not mean to sit and button your mobile phone or move its images, neither to watch TV, passively swallowing elements of information. This type of information is superfluous and, as the body dejects useless matter, as the mind dejects the non-necessary information that is noise. But as the body swollen with useless/harmful matter has different types of ailments, as the mind overwhelmed by noise is sick.

The superfluous information/noise means *trash*. The beneficial information is the result of personal selection and increases the human vitality directed toward human goals. But since the individual selects, does not mean that only he/she is responsible for the information he swallows? Well, he/she is responsible only if he/she has enough information making him/her able to choose. Therefore, the responsibility of information takes place *at the two ends* of the information transfer. The receptor must be capable to select the received information, but the sender must be careful with the emitted information.

But how could he be responsible for this? Are there *criteria* which may substantiate the social treatment of information? The history of the last 200 years – and that of the last 30 years – helps us to conclude that the mass information (as the scientific information targeting a specific group of professionals) must be honest and *serve exclusively the interests of the publics*; dryly, the mass information that serves private restrictive interests is not congruent to the information whose purpose is only the thirst for knowing and the betterment of the general human condition.

Information is in-formation in the two senses of the Latin preposition *in*: it gives the form/the peculiarity of a reality, as well as it opposes an existing form in the sense that it brings in something which disintegrates the old form. Information as such is not tantamount to knowledge, because information is a *description*, while knowledge is the result of *evaluations of many descriptions, selecting from the possible descriptions/realities*. In other words, knowledge is *interpretation* of information, while information is description/appearance/transmission of appearance; that means that knowledge is “organizing into a meaningful whole” of the multiple information; “That’s the essence of subjectivity: taking in relevant aspects of your environment and turning it into something that has meaning for you in relation to your experience and intuition”⁶³.

Therefore, knowledge has a strong mark of subjectivity, it is “red”; information is anonymous and cold, “blue”.

Finally, knowledge is holistic – no matter how precise and targeted it is – in that it has in view the “environment” of specific facts it is about; namely, the significances of these specific facts do not neglect, not even subconsciously, the systems these facts belong to. For example, we may have information about the possibility to manipulate genes, but if we do not think to all the

⁶³ *A New Science of Qualities*, A Talk with Brian Goodwin [4.29.97], <https://www.edge.org/conversation/a-new-science-of-qualities>.

consequences – and not only to the fragmented profitability of this manipulation – our information is lame.

Our difficulty to dissociate knowledge from information comes from the tradition of Western industrial revolution that induced the rejection of holistic science and favoured the analytical, fragmented disciplines which led to a huge progress just through this fragmentation. I do not think that the difference would be between analyticity and intuition (as Goodwin says): in the present ugly *mass disinformation era*, the argument of its supporters is just the possibility of intuition on the basis of the foggy information. But neither Goodwin nor the respectable scientists who think that science would be separated from “ethics” said that our difficulty to dissociate knowledge from information is the *power asymmetry* that – inherently – has characterised the industrial revolutions till today.

However, information is the indispensable premise of knowledge: in the necessary proportion for the problem. Sometimes the absolute exactitude (see Borges⁶⁴), or description is not necessarily an advantage; namely, above a certain threshold, the new information does not give anything. And the too much information may disturb imagination⁶⁵.

But information is indispensable to evolution. There is much more information in a human fertilised egg than in a bacterial cell and thus the egg may develop just on this richer and specific information⁶⁶. Then, knowledge means learning. Even if we metaphorically use the concept of learning for cells – therefore, adapting to conditions and improving/acquiring new equilibrium states – we must distinguish the *conscious human learning* aiming at acquiring knowledge. But as the cells and organisms may lose the new adapted forms because of exogenetic factors, as the *humans may lose* – thus cultural evolution is reversible⁶⁷ – not only *their information, but especially their knowledge*: because of the same external conditions; the information transmitted to the broad masses of consumers may impede their ability to understand the *unitary significances of separated information and of noise*. For this reason, the official documents speaking about the “knowledge society” where the most important features are the use of IT, the “e-commerce”, the e-systems of work in the small and medium enterprises and the security of businesses on Internet, are problematic. They are part of the literature praising the use of IT as the revolution that would automatically change the present world economy into a “collaborative”/“sharing” one, devoid of all the evils⁶⁸.

Noise

⁶⁴ Jorge Luis Borges, “On Exactitude in Science” (1946), in Jorge Luis Borges, *Collected Fictions*, Trans. Andrew Hurley, London, Penguin Books, 1998, p. 325.

⁶⁵ Charles Baudelaire, “Les Fleurs du Mal”, in *Oeuvres complètes*, vol. I, texte établi, présenté et annoté par Claude Pichois, Paris, Gallimard, 1975, p. 82: “Je fermerai portières et volets / Pour bâtir dans la nuit mes féeriques palais”.

⁶⁶ Sir Peter Medawar, *The Phenomenon of Man*, 1961, <http://bactra.org/Medawar/phenomenon-of-man.html>.

⁶⁷ Sir Peter Medawar, *Technology and Evolution*, <http://bactra.org/Medawar/technology-and-evolution/>.

⁶⁸ See Jeremy Rifkin, *The Third Industrial Revolution: How Lateral Power Is Transforming Energy, the Economy, and the World*, New York, Palgrave Macmillan, 2011; Klaus Schwab, *The Fourth Industrial Revolution*, New York, Crown Business, 2017;

Today, Michio Kaku Described What Life Will Look Like in Twenty Years, February 11, 2018, <https://futurism.com/michio-kaku-life-20-years-future/>; Rudy Telles Jr., *Digital Matching Firms: A New Definition in the 'Sharing Economy' Space*, June 3, 2016, Office of the Chief Economist, US Dept. of Commerce; *All the names for the new digital economy, and why none of them fits*, <https://qz.com/548137/all-the-names-for-the-new-digital-economy-and-why-none-of-them-fits/>.

From an epistemological standpoint, the noise is *data without significances*: sounds, flashes of light, roaring, hum, but having no other meaning than that of the existence as such of these data. Noise is perceived from the external world and thus – the more so this perception belongs not only to an individual – the noise may be communicated: there are conscious or unconscious transmitters of noise⁶⁹.

A *quantitative* approach of noise draws attention to the relative character of noise according to the feelings related to it. When we pass near a jackhammer breaking the asphalt, we say that the noise is unbearable. But sometimes, the noise is not so evident: the growl of radio, when we work. But when it sings? 1) The researchers have shown that not any background music is beneficial, and not in any conditions: the too rhythmic or arrhythmic, too loud, too slow (becoming growl); 2) the permanent background music is not always beneficial and does not determine the efficient realisation of the main objective; especially when ideas relating to complex things must be articulated. If we stay all day on TV or Facebook etc., the results are not good: because too much information – so, even music – is harmful; not the information/music as such, but the *too much*. The too much information – sounds, light, odours⁷⁰ – may be grasped by the sense organs. The touching and the taste emphasise the limits of human sensitivity too: we cannot touch everything, not at a dash neither by turn. But there is also (extreme) information that is not sensed, at least not immediately, but only as a result of accumulation (see, the omnipresent advertisements on every page of Internet, in every TV show and movie etc.).

Qualitatively, there is a big difference between the surrounding sounds which are not related to the men's centres of interest in a specific moment, but which – excessive or not/felt as excessive or not – have significances⁷¹ (ex., sounds of automobiles on the street or stopping in front of the house) and, on the other hand, the sounds which are too loud and intensive and arrive to not having significances or to disturbing the creation and tasting of significances of the information important in that moment for people. This difference is showed by the auditory drug discovered as sounds transformed by a special programme into waves producing hallucinations⁷².

The qualitative aspect of noise was emphasised by Roland Barthes who opposed *art* to the social reality. In the former nothing is superfluous, there is neither scarce nor waste, thus there is no noise⁷³. Noise is what *interposes* between the transmitter and the receiver⁷⁴, generating a supplementary effort in transmitting the information, but also – a supplementary effort of the receiver.

Why is the aspect of *significances* so important, so as it becomes the *criterion* of information? This is because we know only what has a *meaning* for us: and certainly, this (contextual) meaning is true, or is assumed by us as true in a certain temporal and social frame. For us, *the nonsense are only noise, have no meaning, and we remove them from our consciousness*.

⁶⁹ In this respect, it is possible to extend the theory of the relationships between *communication* and *information*: if communication is a larger concept than that of information – because communication transmits messages (with data and information), while information is in-formation, thus meaning/meanings of data or messages – then one may communicate noise, intentionally or involuntarily.

⁷⁰ See Mădălina Diaconu, Eva Heuberger, Ruth Mateus-Berr, Lukas Marcel Vosicky (Eds.), *Senses and the City: An Interdisciplinary Approach to Urban Senseescapes*, Berlin, LIT Verlag, 2011; Victoria Henshaw, *Urban Smellscapes: Understanding and Designing City Smell Environments*, N Y and London, Routledge, 2014.

⁷¹ See Hillel Schwartz, *Making Noise: From Babel to the Big Bang and Beyond*, New York, Zone Books, 2011.

⁷² I-Doser, <https://en.wikipedia.org/wiki/I-Doser> [accessed on 25 March 2018].

⁷³ Roland Barthes, "Introduction to the Structural Analysis of Narratives" in *Image, Music, Text*, Essays selected and translated by Stephen Heath, London, Fontana Press, 1977, pp. 89-90: neither fog, nor the excess (the fuzzy, which makes that everything in the back be invisible); and even though a foggy aspect exist in painting, it does not exist in the written discourse which is always the distinct (irrespective of what fuzzy atmosphere it emphasises).

⁷⁴ Roland Barthes, "The Grain of the Voice", *ibidem*, p. 187.

Noise is when many data overwhelm the human, but these data are not/do not convert into knowledge. Thus, a “hidden knowledge”⁷⁵ may well coexist with apparent information: and since this one has no significances, and cannot be related to something known, it is only noise, hiding in fact both the *lack of information given* to men and the *intention* of “senders” to *hide* knowledge. Obviously, a message (communicated) may contain both information and noise: the latter, as either clear noise or superfluous information towards the main information/ideas intended to be transmitted and received. Noise is not tantamount to information redundancy, but this one is treated by the receiver *as if* it would be noise: it is not retained at all – thus, even possible interesting data are removed from the consciousness – or the whole diffuseness is swept and more or less accurately synthesised in an immediate significance: only this significance is retained.

Therefore, noise is not only a *quantitative overwhelming* of the individual with data without relevance, but also a *semantic deformation* and a *logical fallacy* which alter – with or without intention – the significances received by man and his ability to detect and construct new logically sound meanings⁷⁶. On the contrary, the loss of attention generates sensitivity only to tangible, immediate and simple realities, in a kind of childish naïve realism. The result is *opinion* (in Plato and Aristotle’s meaning) – without arguments and analysis of causes and consequences, not even of the *cui prodest* aspect, familiar to all the readers of classical detective novels – and, in the general cacophony, a vain adding of sounds/words to the other opinions.

Noise has significance of garbage/waste, but at the same time – of the fact that the noise is *bad* information: unnecessary, unpleasant, and harmful. Nevertheless, the bad information does not convert only into noise: it may be integrated within the system of received information and *supported*⁷⁷. But it will have bad results: even if or just because people are *educated to not have criteria* for discerning the bad and the good information⁷⁸.

The human being and information

This aspect is studied here from the perspective of *the receiver*. But since information always supposes relationships, it is relation, this perspective may be found in the whole existence: even at the level of inorganic existence there are, metaphorically speaking, receivers and senders. Probably, the first material relationships were disordered, and an answer to this state was information/the emphasis of the informational side of matter which in-formed (put a form

⁷⁵ Albert Van Helden, “Introduction”, in Ida H. Stamhuis, Teun Koetsier, Cornelis De Pater, Albert Van Helden (eds.), *The Changing Image of the Sciences*, New York, Springer Science+ Business Media, 2002, p. 1.

The model of the author was the seizure of knowledge by gods (and Prometheus striving against this). Nowadays, the model is the end of open Internet, but also the polarised education in schools and society.

⁷⁶ See *Microsoft Attention Spans Research Report*, Spring 2015 (scrutinizing the ability of “consumers” to delight in more and more media consume): “increased media consumption and digital lifestyles reduce the ability for consumers to focus for extended periods of time”; “Today, multi-screening is a given, so it’s reassuring to know that multiple screens don’t reduce the (potential) impact of advertising. Since consumers turn to their secondary screens to fill in those in-between moments when they might otherwise drop off completely, they’re more engaged overall and already primed for immersive experiences”; “Attention is obviously a necessary ingredient for effective advertising, but Canadians’ digital lifestyles are changing the brain, decreasing the ability for prolonged focus and increasing their appetite for more stimuli”; “digital lifestyles deplete the ability to remain focused on a single task, particularly in non-digital environments. But, all is not lost. Connected consumers are becoming better at doing more with less via shorter bursts of high attention and more efficient encoding to memory Marketing too must evolve”; “news reduced to 140 characters and conversations condensed to emojis”.

See also Nakshatra Pachauri, *Trolling clouds judgement*, Monday, 26 February 2018, <http://www.dailypioneer.com/VIVACITY/trolling--clouds-judgement.html>.

⁷⁷ As the present advertisements and official news (never labelled as “fake”: for the dominant ideology, only the adverse news is fake).

⁷⁸ Jean-Claude Michéa, *L’enseignement de l’ignorance et ses conditions modernes*, Paris, Climats, 2006.

facilitating some relationships) the matter: and the assemblage of answers/information in the process of movement led to “order”⁷⁹, repetition and relatively stable structuring.

In the living world, the character of information of *being an answer* is the most evident: the living system answers, through excitatory and inhibitory relationships, to stimuli which are both matter and information. A working definition of information is here: elements and structures of stimuli/input, thus *noetic* elements and structures which determine answers in the complex matter-information system in order to keep or lead to a balanced state of the system, allowing the preservation and development of the system as such with the lesser energy.

The highest level of information as a perspective of the receiver manifests in the world of man. Because of multi-layers/ multiple levels of mediation of information between its emitting and its reception by the consciousness, the final information is different from the initial information. (But the mediation – the entire constructivist approach – does not depend only on the bio/physiological levels, but also on the artificial/cultural/social ones).

As answer, so as information from the perspective of the receiver, this information is re-introduced in the movement of matter: information, as well as matter, being “bricks” of the existence/structuring and transformation of the world. But this means that, before being transposed into reality – and in the case of man, before being worked, mathematically emphasised – the information is for man, given to him. The ultimate object and goal of this paper is just the information *given by man*: to man, of course.

Here, we have broken up the information given by man in the information given *in sciences* and the information given *in society*. The two domains, however intertwined, must not be mixed; they are not able to reciprocally substitute each other: for example, the fact that in sciences we witness positive processes of clear languages and precise theories – and the appearance of new standpoints generated by new information shedding a fresh light on already banal information⁸⁰ – or of transfer of information from one science to another⁸¹, or of transparent falsification, does not mean that these processes are the same related to the information given in society.

In sciences, one may point: 1) the constraints of knowledge: for example, the problem of the access to information; 2) the high specialisation of sciences – with enormous informational stock in each of them leading to the difficulty of inter-disciplinary access; 3) the consumption of information, that is not a relation between an abstract and neutral individual and, on the other hand, the pile of “averagely neutral” information of sciences; 4) the intellectual misconduct.

Is there a *criterion* to evaluate the good or wrong information in sciences? There is, certainly, that related to the process of falsification: *the consequences* within the theory, the domain, and the extra-domain (scientific space, technology and society). Thus, constructed on the basis of information, a scientific theory is itself an information and may lead to better proofs only by the fact that it has demonstrated that “that way/hypothesis was wrong”; or by the fact that it requires or entails concepts and theories from without its own corpus or domain; or by the fact that it is a more workable and fruitful theory than the older one; or by the fact that the technology created on its basis is more sustainable etc. In order to meet this criterion, science has some *epistemic standards*

⁷⁹ This is, too, a concept, a human standpoint.

⁸⁰ See Alissa Cordner, *Toxic Safety: Flame Retardants, Chemical Controversies, and Environmental Health*, Columbia University Press, 2016 (showing also that the decision makers use scientific evidence to support non-scientific goals).

⁸¹ See, for the transfer of information from biology to informatics, Gheorghe Păun, “Some Wonders of a Bio-Computer-Scientist”, Bulletin of the International Membrane Computing Society, 2016, <http://membranecomputing.net/IMCSBulletin/> pp. 241-260.

codified as *ethical norms of science*⁸², and any violation of these norms generates more or less visible false information and bad results.

In society, we all confront the *willing* and *involuntary* distortion of information. The concept naming the first is *propaganda*⁸³: “In a propaganda system, an overarching objective is to render the messaging invisible by universalizing it within the culture”⁸⁴. It shows the monistic, unilateral and biased standpoint of the emitted information, namely of the intention to impose this pattern of thinking on the receivers. Generally, the imposition is not brutish, but “soft”, as technologies of total control producing the *social imaginary* (narratives/myths, worldviews and life styles)⁸⁵. For this reason, the introduction of IT to better collect data about individuals and so to sold them in order to more efficiently influence “their freedom of choice” in shopping and political elections makes only a *difference of degree*, and not of nature, towards the pre-IT era advertising and printed press, radio and television ideological bombardments. The periodical media scandals “divulging” the amplitude of misinformation – with⁸⁶ or without the newest IT – are the proof of the same nature of the old and new propaganda and advertisement industries, and also of the harmful ideology that propagates the idea that the economic and political lies would be only “*excesses*” not touching the very essence of the “free market”.

Clearer, the difference of degree is because the instruments of free choice – really free access to information, and rationalist education offering the logic and the requirements to always analyse the situations according to their *consequences* on broad scale and long term, too – were and are systematically minimised. What is missing in the dominant ideological supplies is the *rational discourse* or rational *real dialogue*. It is true that in the public space there is too much noise, incessant talk shows (never solving anything) and a permanent “buzzing” of mobile phones connections and abuses of apps; but all of these *do not substitute* not only the face to face conversation that really cures⁸⁷, but especially the rational arguments/debates. In front of the above-mentioned noise, the solution is not so much silence, solitude and contemplation⁸⁸, but *rational arguments/debates*: or (as the authors suggest) silence, solitude and contemplation as existential conditions for the rational arguments/debates.

And since with all means the propaganda is no longer as effective as desired, a technically *selective access to information*, even a *ban of the free access* is established: another proof of

⁸² Robert Merton, “The Normative Structure of Science” (1942), republished in Robert K. Merton, *The Sociology of Science: Theoretical and Empirical Investigations*, Chicago and London, The University of Chicago Press, 1973, pp. 267-278: universalism, communism, disinterestedness, organized skepticism.

⁸³ For the word – in Latin, *what is to be propagated* – see the College of the Propaganda, founded by Pope Urban VIII in 1627 for the education of missionary body of Catholicism.

Edward L. Bernays, *Propaganda*, New York, Horace Liveright, 1928, p. 19: “The minority has discovered a powerful help in influencing majorities. It has been found possible so to mold the mind of the masses that they will throw their newly gained strength in the desired direction”. In Bernays’ the “new propaganda” was specific to both political democracies and market economies.

⁸⁴ Jason Hirthler, *Colonizing the Western Mind*, 06/03/2018, <http://www.defenddemocracy.press/colonizing-the-western-mind/>.

⁸⁵ Juremir Machado da Silva, *Les technologies de l’imaginaire: Médias et cultures à l’ère de la communication totale* (2002), Traduit du portugais (Brésil) par Erwan Pottier, Paris, La table ronde, 2008.

⁸⁶ As the present Cambridge Analytica scandal, see only *The Latest: Zuckerberg admits mistakes, outlines steps*, 21 March 2018, https://www.washingtonpost.com/business/technology/the-latest-academic-in-facebook-case-says-he-is-a-scapegoat/2018/03/21/218deec8-2cec-11e8-8dc9-3b51e028b845_story.html?utm_term=.547ee5b4708e.

⁸⁷ Sherry Turkle, *Reclaiming Conversation: The Power of Talk in a Digital Age*, New York, Penguin, 2015.

⁸⁸ Ana Christina Zimmermann & W. John Morgan, “A Time for Silence? Its Possibilities for Dialogue and Reflective Learning”, *Studies in Philosophy and Education*, 35 (4), 2016, pp. 399-413.

For the concept of silence, a beautiful, interdisciplinary book about the formation of meanings: David Le Breton, *Du silence*, Paris, Éditions Métailié, 1997.

restrictive ideological criticism of the means of information is just the silence of the mainstream media regarding the end of net neutrality⁸⁹.

The result is “a *proletarianization of the sensibility* of the consumer through the apparatuses for the canalization and reproduction of perception”, proletarianization meaning “a *loss of knowledge*”⁹⁰. The more the rational analysis shows the inadvertence⁹¹ and absurdity of propaganda narratives, the more its techniques and intense rhythm develop. But this conclusion of logically aberrant propaganda statements is not sufficient: these statements are not proofs of neutral irrationality, but are the results of *class interests* and *power asymmetry* at both country and world levels. Even the collective character of the construction of info-sphere⁹² is framed by/subordinated to the class interests and more precisely, to the dominant class interests. For these interests, *logics* as such, the *rational analysis* and the *scientific collecting of information* are even subversive. For these interests, the emphasising of *interdependencies*, of *integration* of the human, including technological, and natural systems, of the absurdity of separated treatments of these systems, of the *dialectical unity* of man as individual and social, are subversive: this is the extra-science reason of the backwardness of scientific theories and tools to “taming” complexity⁹³, thus of the social integrated systems.

Therefore, there already is a *criterion* that differentiates between propaganda and the rational communication: the rational and dialogical character of the latter. But even this criterion must be justified: thus, the criterion of the above criterion is the system of *consequences* of each type of social communication. This criterion shows how the rational and dialogical communication leads to a *holistic* conception of the world, including spatial holism, to an *integrated conception of time* (short, medium and long term consequences), and to a *dialectical conception of man*, as being and *individuality* in a *multitude* and thus striving for his *telos* as both individuality and multi-face totality⁹⁴.

In contrast to the situation in both inorganic and non-human living worlds levels, the information given by humans to humans is not natural and inevitable, and so one cannot speak about it in an expert-type sibylline manner. Because: the information given by humans does not have neutral consequences, since this special being exists only by actively transforming his

⁸⁹ Jonathan Cook, *From an Open Internet, Back to the Dark Ages*, November 24, 2017,

<https://www.counterpunch.org/2017/11/24/from-an-open-internet-back-to-the-dark-ages-2/>.

Frances Moore Lappé and Adam Eichen, *We Saved Net Neutrality Once. We Can Do It Again*, December 14, 2017, <https://www.globalresearch.ca/we-saved-net-neutrality-once-we-can-do-it-again/5622791>.

⁹⁰ Bernard Stiegler, *The Proletarianization of Sensibility*, 2011,

<https://web.archive.org/web/20120427133515/http://www.lanaturnerjournal.com/essays/prolsensiestiegler.html>.

⁹¹ See Gioulieto Chiesa, *The point of view of Natalya Kasperskaya: from the “Russian hackers” to the “Manchurian candidate”*, 30/05/2017, <http://www.defenddemocracy.press/the-point-of-view-of-natalya-kasperskaya-from-the-russian-hackers-to-the-manchurian-candidate/>.

⁹² Cass R. Sunstein, *Infotopia: How Many Minds Produce Knowledge*, Oxford, New York, Oxford University Press, 2006.

⁹³ See Albert-László Barabási, “Taming complexity”, *Nature Physics*, Vol. 1, 2005, pp. 68-70.

⁹⁴ This many a day, John Stuart Mill (1806-1873) has considered the what for of man, the striving for the humanity of this being at its highest level possible, for the highest number of these beings, but this meaning *for all and every human being*: „in the comparatively humble sense, of pleasure and freedom from pain, and in the higher meaning, of rendering life, not what it now is almost universally, puerile and insignificant – but such as human beings with highly developed faculties can care to have”, John Stuart Mill, *The Collected Works of John Stuart Mill, Volume VIII - A System of Logic Ratiocinative and Inductive, Being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation (Books IV-VI and Appendices)*, ed. John M. Robson, Introduction by R.F. McRae, Toronto, University of Toronto Press, London, Routledge and Kegan Paul, 1974, Book VI, Chapter XII, http://oll.libertyfund.org/index.php?option=com_staticxt&staticfile=show.php%3Ftitle=247&layout=html#chapter_4043.

environment, and since he values and has a twofold sentience/feeling related to the matter-information inter-human change, the sensorial/material one and the spiritual, in his consciousness.

Yes, the problem is to *distinguish* the reactions of inorganic matter, possible just because matter is in-formed, from the reactions of the living beings, pushed by *conatus*⁹⁵ and having a certain capacity to transform their ambient, and from the *conscious* actions of human beings, pushed not only by their *conatus* but also by their conscious valorisation of the features of life – as living well, and living better⁹⁶ – and their purposes, the *telos* of their life⁹⁷. As I said before, there is certainly a *continuity and community* of these three worlds, manifested through the reactivity of in-formed matter, but there is also a *discontinuity and specificity*. The human *consciousness* is which gives this specificity: the multiple and always rationally⁹⁸ and ethically⁹⁹ analysed goals and goal-oriented actions, both in an always larger space and on moving temporal terms. The non-human living beings have certainly different degrees of rudiments of consciousness: as a kind of access¹⁰⁰, reflective “consciousness”, allowing the proper reactions, the sentience and the reactions determined by *conatus*. But the *phenomenological* consciousness, the human *interpretation* of feelings, facts, reactions – thus beyond the former sentience – pertain only to man.

This is the reason of the big difference between the diseases of non-human living beings and humans: in the former, the diseases are natural transformations toward other forms of life (as cancer) or toward inorganic matter. Thus, we only deplore the pains suffered by these beings. While only in humans has the disease its *interpretation/judgement from the point of view of the unique and unrepeatable individual*. However natural, the disease is viewed by man as the evil, even though he does not always know what generates it. He obviously finds and supposes some visible causes, but he finds them only to the extent that they are *made* to be visible: by science of course, but concretely by the totality of institutions representing not so much neutral tendencies of the process of knowledge as private biases; thus, these institutions are “ailing”, selecting according to the mentioned biases the memories of society¹⁰¹ and fragmenting in disparate and even superfluous episodes the *unity* of knowledge, cognisance and memory.

And this is the reason of the appearance of a special disease of humans: *informatonosis*. In the other living beings, sufferings and decay are produced rather by matter and information together. Only when the animals live in environments artificialised by humans, they may experience a discomfort induced by different forms of information, or better, *excesses* determining excessive answers¹⁰²: too much light in the night, or noise all day, or cruel attitudes of humans towards them.

But *informatonosis* occurs only at man: because only he may separate information from matter, the significances and their multivalent consequences from the simple material supports of these significances. However, if there is *informatonosis*, there is also a “*hyleosis*” (if I may borrow the concept of matter from Aristotle), a disease made by matter. People feel not only the unpleasant

⁹⁵ The instinct of life. Or as the German philosophers of the first half of the 19th century formulated: “the will to live”.

⁹⁶ Alfred North Whitehead, *The Function of Reason* (1929), Boston, Beacon Press, 1958, pp. 4–5.

⁹⁷ See Ana Bazac, “Three concepts in the history of the knowledge of the world (cause, consequence, *telos*) and a conclusion”, *Biocosmology – Neo-Aristotelism*, Vol. 7, No. 2, Spring 2017, pp. 155-177.

⁹⁸ But not always reasonably, isn’t not?

⁹⁹ This means: from the standpoint of inter-human relationships and the inherent judgements of these relationships and their elements/the concrete positions of humans in these relationships.

¹⁰⁰ Uriah Kriegel, “The Concept of Consciousness in the Cognitive Sciences: Phenomenal Consciousness, Access Consciousness, and Scientific Practice”, in P. Thagard (Ed.), *Handbook of Philosophy of Psychology and Cognitive Science*, Amsterdam, North Holland, 2006, pp. 195-217.

¹⁰¹ Bernard Stiegler, “Our Ailing Educational Institutions”, *Culture Machine*, Vol 5, 2003.

¹⁰² See J. Brewis, C. Sanderson, and E. Wray-Bliss, “Interrogating excess: the case of organisational drug and alcohol policies”, in *SCOS 2005: Excess and organization: Proceedings of SCOS XXIII*, Department of Industrial Management and Organization, Royal Institute of Technology, Stockholm, Sweden, 2005.

aggressive overwhelming advertisements, but also the unhealthy food they are determined to buy, including through the incorrect advertising.

Once more, in non-human living beings the information-made disease occurs only when these beings live in artificial, human milieus.

***Informatonosis* as malady of the receivers of information**

Therefore, from the point of view of their consequences – the answers they challenge – the information given by man is good and bad, with many nuances between these two limits. The bad information determines integrally changed states of humans, leading to altered answers altering their health, behaviour and social relationships. *Informatonosis* is the disease generated by the bad information given by men and affects the receivers of this type of information.

Rudolf Klimek has coined the name and (from 1999 on) conceived of the *informatonosis*¹⁰³ as a disease generated exclusively by the bad/incorrect information given to patients (for example, about the human organism, about diseases and medical procedures and medicines), but generally to the whole society; differently from the morphological causes or related to the energy change of the organism, *informatonosis* affects the complex brain-consciousness and, thus, the entire organism. For example, the transmission of partial information, exclusively positive, about the Caesarean operation, generates the choice, by the pregnant women, of this type of surgery, to the detriment of normal birth, highly beneficial for both mother and child.

But this example shows that *informatonosis* is a disease indirectly generated by information, so by information *transposed into* behaviours and choices. However, this indirect generation does not annul its cause. Actually, many dysfunctions and illnesses are the direct result of bad behaviours and choices/of processes in the consciousness, considered as “*efficient causes*”, if we use Aristotle’s term. And the consciousness is always an intermediary between the organism and the environment. But for a disease to take place, one needs also *material* and *formal* causes (preserving Aristotle’s categorisation).

Therefore, if matter and energy/the deficient matter-energy change of the organism with its environment may come down with the organism, information too may be a cause of diseases. And this is both in the already pointed intertwining of matter-energy-information change between the living beings and their environment, and the faulty and even bad information given in society and harming the humans. As it was mentioned, generally a bad supply of matter and energy is accompanied with bad information; for example, the advertising for unhealthy food; the opinion that every individual has the freedom to choose according to his/her own will, and not to the suggestion of advertisements, is false: because these advertisements for bad food have the function to justify/legitimise the inevitably future “choice” of this food, since the buyers cannot buy eco. And yet in the dominant *ideology*, matter, energy and information are treated *separately*: as if they would not have the same features and influences over the humans. But concretely, the faulty information is united with the transfer of faulty matter and harmful energy.

What kind of information generates illnesses? First of all, there is about institutionalised – official, in a way or another – information, thus having a bigger authority than that from inter-subjective relations, and thus being the communicational interface between the dominant supply of matter, energy and information, and the receptors. Then, if we understand the illnesses as *imbalance* of the organism/its parts, with chaotic, controllable or uncontrollable, even lethal, consequences, or

¹⁰³ See Dariusz Jasiczek, Rudolf Klimek, Ryszard Tadeusiewicz, “*Informatonosis* – an information disease affecting the society”, in Rudolf Klimek, Dariusz Jasiczek, Ján Štencl, *Explained Cause of Cancer*, Hermes Management, Krakow, 2013, pp. 79-84.

if we understand the maladies as *de-formation* – that means in the philosophical formulation taken over from Aristotle, the organism's deprivation of its form that alone gives life/viability to the material constituents it is united with – we may well see that the *quantitative excesses* of information (too much, too few) and *qualitative excesses* (deliberate distortion of information) may lead to *informatonosis*.

One may object that the concepts (excess, excessive) are relative – actually, they are historically and socially determined – and thus one cannot scientifically point from which levels of excesses may an illness as *intolerance* of the whole psychic and organism to the given data or information occur. Nevertheless, one may counter this objection: first, by showing that while our cognisance is relative, the bad consequences are not at all so, because they are measurable. *The general dysfunctional state is real*, even though the precise detection of causes is difficult. But – and this is the second argument – when we have a logical theoretical demonstration of the causal phenomena and at the same time we have the consequences which do not contradict the logical demonstration, we do not need to measure the causal phenomena because the measurements do not bring something new in principle and nor do they change the theoretical demonstration¹⁰⁴. Anyway, as it already was mentioned, not only that the faulty information produces choices and behaviours, so vicious changes of matter and energy between the organism and the environment, but the faulty and excessive information are always accompanied by the society's excessive/harmful supply of matter and energy for the human organism (ex. the distorted information about food and medicines comes together with unhealthy food and bad/unnecessary medicine, as the psychic drugs producing an *acquired mental alienation*¹⁰⁵).

The informational excesses generate *cognitive barriers*¹⁰⁶ leading to unfavourable access of individuals to information: if information is missing, the access is perturbed and people's creative answers are poor; the examples of both scientists¹⁰⁷ and the helpless citizen in front of malefic political facts are illustrative; if there is too much information – but certainly subordinated to the political interests for which just the superficial information thrown to the population and avoiding the rational analysis of causes and consequences, just the abuse of noise are imperative – it acts as a drug: because “the world in which we live is very nearly incomprehensible to most of us”, people believe everything; “information no longer has any relation to the solution of problems”; “Information is now a commodity”; “we no longer have a coherent conception of ourselves, and our universe, and our relation to one another and our world”; “we don't know what information is relevant, and what information is irrelevant to our lives”; “what causes us the most misery and pain - at both cultural and personal levels - has nothing to do with the sort of information made accessible by computers”; “The computer and its information cannot answer any of the fundamental questions we need to address to make our lives more meaningful and humane”¹⁰⁸. This *too much* means redundancy, technically solved by IT, but not socially; in front of this situation, the

¹⁰⁴ Émile Durkheim, *Les Règles de la Méthode Sociologique* (1894). Paris, Les Presses Universitaires de France, 16e édition, 1967.

¹⁰⁵ See only Janet Currie, Mark Stabile, Lauren Jones, “Do stimulant medications improve educational and behavioral outcomes for children with ADHD?”, *Journal of Health Economics*, Vo. 37, September 2014, pp. 58-69; Maria Keilow, Anders Holm, and Peter Fallesen, *The Effects of Medical Treatment of Attention Deficit Hyperactivity Disorder (ADHD) on Children's Academic Achievement*, The Rockwool Foundation Research Unit, Study Paper No. 83, Copenhagen 2015.

¹⁰⁶ Mirosław Zabierowski, “Disorder of Regulative Functions of Management in the Light of Informatonosis”, *Security Dimensions: International and National Studies*, No. 13, 201, pp. 88-94.

¹⁰⁷ <http://thecostofknowledge.com/>; but the property rights of journals do not exclude non-scientific practices of both the journals and the researchers, see *Nobel winner declares boycott of top science journals*, 9 Dec. 2013, <https://www.theguardian.com/science/2013/dec/09/nobel-winner-boycott-science-journals>.

¹⁰⁸ Neil Postman, *Informing Ourselves to Death*, German Informatics Society, 11 Oct 90, Stuttgart.

individual “defends” himself by *unselectively refusing information* (as if the information as such would be his enemy, and not the supply, or rather the decision-makers of this supply).

The distortions of information lead to *cognitive dissonance* and *alienation* (autism, living in the imaginary, cynicism, proclivity of euphoria, repulsion to focus on and to be aware).

The *corrective* measures arrive – because of the already mentioned asymmetry of power relations in the modern and contemporary society¹⁰⁹ – when it is *too late*: not only for nature when species have disappeared and the imbalances have led to irreversible and irretrievable losses, but also for many human beings which are, every one of them, unique and unrepeatable and wasted their life.

The ICT continues to solve the problems of the control of information mainly from the standpoint of the *senders*. But it is time to solve these problems from the viewpoint of the *receivers*. Though *informatonosis* is the name of the combined consequences of the social information in the present domination-submission society, it may be the basis of this approach. The transfer of information to the human receptor is not a neutral and natural process. Its concrete manifestations are not at all inevitable and do not lead automatically to the human progress (“more information is wellbeing”, as a supposed *dolce far niente* for all).

Instead of conclusion, a philosophical antidote: the ancient suggestion of *measure*

A concept that may be used as a *criterion* towards the excesses – of matter, energy and information – is the ancient *measure*¹¹⁰. Not only as sobriety. Aristotle has showed that if men do not follow the golden mean in all their activities, they generate bad consequences both for themselves and for society. How can we measure this mean and thus, the distance between its own limits and the external limits of excesses, it’s not a so unsolvable question as it appears in different sophistries: *we must accord our search for the respectable mean and the avoiding of the excessive with the understanding/anticipation of the consequences of different paths we possibly may follow*, said the Stagirite. Therefore, the search for the mean is not prudent mediocrity – as some ones would believe – but it emphasises the *rational* ability of man, that of foreseeing (like Prometheus), of being able of *intellectual experiments* and thus, *imagining the consequences*, being able to remake the present actions: au fond, this is *anticipation*.

¹⁰⁹ And the dominant powers have subordinated the public communication and many scientists. See James Hansen, *Scientific Reticence and the Fate of Humanity* (A Draft Discussion), 26 October 2017, http://www.columbia.edu/~jeh1/mailings/2017/20171026_ScientificReticence.pdf.

¹¹⁰ Analytically, we may remind that *measure* is between the *too little* and the *too much*. If the historical origin was the *too little* – because of the ontological feature of rarity (Sartre) – the two concepts are interdependent, though contrary. But if the origin is the *too little*, it means that it is what remains/last/what is *recessive* – if we borrow the term from the Romanian Mircea Florian, *Recesivitatea ca structură a lumii*, I, Ediție îngrijită, studiu introductiv și note de Nicolae Gogoneață și Ioan C. Ivanciu, București, Editura Eminescu, 1983 [Recessivity as structure of the world] – while the *too much*, although dominant, only follows the *too little*. Just for this contrary coexistence – they explaining each other –, their understanding supposes the third, mean concept, *measure*.

But: our European manner of thinking is that of the two contradictory concepts, and the solution is that of the adverse situation (the *too much* “solving” the *too little*). Because we are used to think in the pattern of the power relations – clearer, of the capitalist worldview – the *too much* is generally thought as the only remedy for the *too little*, and the *too* has little or no importance.

This manner of thinking pertains to the technologists who consider that the only solution to the *lack* (of products etc.) is the amplification of the productive means. This is the technological optimism, where technology would have only positive values and all the social evils will be resolved by technology. For example, in the domain of ICT, the solution is more information.

But philosophy doubts, and questions the *premises* of every assumption.

As we know, the Delphi temple of Apollo has mentioned on its wall the old Greek saying warning against excesses: μηδέν ἄγαν (nothing over measure/too much), as *measure* or *proportion*, *refusal of any excess* and *prudence*. Nature may experience the too much or the too little, but it simply *integrates* them or *transforms* when they are harmful towards its former equilibrium and more powerful than this equilibrium: in this sense, nature does not know excesses. The saying addressed the humans, because only they can choose and have discernment; and only they are who press nature in a so excessive manner that nature can no longer integrate the too much and the too little, and is dying. Applying the adage to our problem, to have matter and information above measure and without measure has repercussions for the balance of all the human systems: one no longer feels “at home” – the *oikeiosis*, as the Stoics said – neither in his own skin nor in his natural and social environment.

More: nature was seen – and indeed, it still is – as the ambient that protects us, as Plato’s *khôra*, or receptacle; or the place man is hiding within. But the warning of the wise men targeted the humans because to hide in nature was and is not enough. The value – thus the possibility and feasibility – of rational thinking and conduct (*measure* or *prudence*) was promoted and certainly existed in the popular wisdom just in order to signal that the human beings are not inexorably determined to behave in such excessive ways that the only refuge remains the wild nature; because in this refuge man arrives to accommodate with the wildness¹¹¹. Therefore, if for man *the excess is not inevitable*, neither his diseases – as *informatonosis* – are inevitable.

In the same line of reflexivity related to the consequences, the modern sciences have advanced the *prudence* of *Occam’s razor* (economy of explanation forbidding the unnecessary multiplication of hypotheses and concepts), the *parsimony* of character-based tree representations as phylogenetic analysis, even the *elegance* of mathematical demonstrations. Here not the simplicity that may send to simplification is important, but the involved principle of *measure*.

Science means the control of its object. Obviously, the creation, understanding and control of the object constitute a long and difficult task. But we do not forget that the object of sciences is also, in different ways, the milieu of man. In its turn, ethics is the theoretical control of the subject. The historical character of sciences and the difficulty to control both the objects of sciences and the subject of ethics have manifested through (and led to) the *separation* of the subject of ethics and the objects of sciences. This separated treatment took place in the dominant philosophy too¹¹². For this reason, even though in the last decades of the 20th century some integrative sciences have constituted – as ecology and IC sciences – therefore, having as their object the subject-object *relation*, the paradigm of separation has continued. The present more or less timid interdisciplinary studies still are separated from ethics, i.e. from the responsibility of concrete folks in the treatment of the objects of sciences. In this respect, the old concept of measure warns us about the necessity of an integrated approach of the objects of different sciences, including the social ones, actually, the necessity to take into account the *integrated consequences* of different forms of control.

¹¹¹ The traditional representation of nature as an absolutely exterior entity to man – either as a protective receptacle, or as Hobbes’ nature as the environment for the natural right/freedom to behave in a feral manner – has included the idea that man’s deeds, as part of nature, would be as objective as the natural phenomena are. Hegel has reversed that representation only half: he advanced the concept of estrangement/alienation as objective relation of man and his creations. Heidegger has taken over this line of reasoning, showing the objective alienation of man from technology. But Marx has demonstrated that the process of estrangement is *socially determined*, thus not natural but historical. The significances the alienated man gives to his objects, and to nature, are thus subjective. But if so, the estrangement as such is a transient social phenomenon.

¹¹² In the 19th century, Marx has introduced both in philosophy and science the paradigm of subject-object *integrated* treatment.

Finally, the concept of measure is not only a suggestion of precaution in manners and parsimony in scientific thinking. Finishing in the same note of constructivism, we may remind that *man is who constructs the meanings of life*: of his own and of the others beings. Therefore, the meanings of life are forged by man and only by man: he does not discover them, he creates them. He cannot say that he finds the meanings – *as if* these ones would have been created by an exterior artificer, and became objective facts as the rain or the sun – and he could not intervene over them. If he would behave in such a manner, he would arrive also to the *lack of meanings*: concretely – and certainly letting aside the scientific research – for us the rain and the sun have secondary importance; we were wearing sunglasses or we use umbrellas, but neither the sun nor the rain are of any importance for our imagination of and struggle for a human life.

In other words, the dry epistemological characterisation of constructivism reveals us the (idea of) *responsibility* of man towards his constructions and towards the consequences of these constructions. Responsibility means “to keeping measure” with the meanings of life of *all* the human beings: and since *the individual life is unique and unrepeatable*, the meanings of life are just those of the *potentialities* of this unique and unrepeatable life and of the *struggle* against both the consideration of these potentialities as meaningless, and the transfer of the human responsibility for the meanings of life to an external trans-mundane fantasy.

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