

Article

# The Naturalization of Natural Philosophy

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**Abstract:** A new demarcation is proposed between Natural Philosophy and non-Natural Philosophy—philosophy *tout court*—based on whether or not they follow a non-standard logic of real processes. This non-propositional logic, Logic in Reality (LIR), is based on the original work of the Franco-Romanian thinker Stéphane Lupasco (Bucharest, 1900–Paris, 1988). Many Natural Philosophies remain bounded by dependence on binary linguistic concepts of logic. I claim that LIR can naturalize—bring into science—part of such philosophies. Against the potential objection that my approach blurs the distinction between science and philosophy, I reply that there is no problem in differentiating experimental physical science and philosophy; any complete distinction between philosophy, including the philosophy of science(s) and the other sciences is invidious. It was historically unnecessary and is unnecessary today. The convergence of science and philosophy, proposed by Wu Kun based on implications of the philosophy of information, supports this position. LIR provides a rigorous basis for giving equivalent ontological value to diversity and identity, what is contradictory, inconsistent, absent, missing or past, unconscious, incomplete, and fuzzy as to their positive counterparts. The naturalized Natural Philosophy resulting from the application of these principles is a candidate for the ‘new synthesis’ called for by the editors.

**Keywords:** common good; contradiction; ethics; information; logic; naturalization; realism; science; synthesis

## 1. Introduction

In 1949, it was still possible for Alfred Ayer [1] to write: “. . . the function of the philosopher is not to devise speculative theories which require to be validated in experience, but to elicit the consequences of our linguistic usages. That is to say, the questions with which philosophy is concerned are purely logical questions; and though people do in fact dispute about logical questions, such disputes are always unwarranted. For they either involve the denial of a proposition which is necessarily true or the assertion of a proposition which is necessarily false.”

Fortunately, this binary, apodictic position has been largely deconstructed by more recent philosophical work, especially by transdisciplinary, realist approaches to consciousness and mind. Examples are the concept of the embodied mind of Lakoff and Johnson [2], an extension of basic phenomenological positions introduced by Merleau-Ponty, and the philosophy of neuroscience of Bennett and Hacker [3]. This period has also seen the development of the philosophy of process, extensions of the work of Whitehead [4], Rescher [5], and Seibt [6]. Another current field of research is that of the philosophy of information, pioneered by Wu Kun in China [7] and Luciano Floridi in Italy [8].

Unlike Ayer, I expect of philosophy that, like science in a different way, it tells us something about nature, man’s unique position in nature and his interaction with it. It is nevertheless a body of knowledge, a theory of reality that can fail in two major ways. It can overemphasize the difference with science, as in the anti-scientific aspects of phenomenology and idealism in general, and it can

relegate all non-tangible phenomena, not demonstrable by physical experiment, to the realm of epiphenomenalism. The concept of a Natural Philosophy, which has evolved into science, raises the further complication of what *it* is and how it differs from philosophy *tout court*. The domain of philosophy is further in fact divided by its relation to science. Analytical philosophy recognizes the central role of science, but applies to it an inadequate conception of the logical operation of complex processes and living systems. Continental philosophers and anti-realists such as Bas van Fraassen ('Constructive Empiricism') are fundamentally anti-scientific and thus lack a necessary link to reality. Both kinds of theories thus fail for similar reasons.

### 1.1. Outline of Paper

In this paper, three lines of discussion will be pursued: (1) the demarcation of Natural Philosophy by a non-standard, non-propositional philosophical logic which I have called Logic in Reality [9] (LIR); (2) the application of LIR to stubborn problems within the philosophies of process and science, as well as in Natural Philosophy itself as previously delimited; and (3) the role of recently developed philosophies of information, consistent with LIR, in bringing a new ontological dimension to philosophy. I begin by a first exposition in Section 2 of the differences I see between Natural Philosophy and Philosophy in general, philosophy *tout court*. Section 3 is a brief outline of LIR. LIR is grounded in physics, but its elements are the evolving states of natural processes, biological, cognitive and social. Section 4 presents some of the conceptual precursors to LIR in relation to Natural Philosophy, including the ontological philosophies of physics and process [10] for comparison with speculative linguistic–epistemological philosophies. Section 5 centers on phenomenology and its relation to Natural Philosophy, and addresses the issue of naturalization as a hermeneutic strategy. The next Section 6 analyzes the developing philosophies of information of Floridi and Wu. I argue that the latter anticipates the convergence of science and philosophy foreseen for Natural Philosophy.

### 1.2. A New Synthesis

In their Introduction to this special issue for *Philosophies*, its editors, Gordana Dodig-Crnkovic and Marcin Schroeder, refer to the disjunction above in their call for a new synthesis of scientific and philosophical knowledge. Whatever else may be true about it, such a synthesis, re-integration or rejunction of knowledge with its origins must provide for a grounding of human value systems in that knowledge. This is a minimum necessity for its use in support of the common good.

A new synthesis should, among other things, go beyond the familiar analytic/synthetic distinction. One can envisage the appearance of a new Synthetic Philosophy that will be a better natural partner, in both senses, of Analytical Philosophy than is the diffuse and not very useful concept of Continental Philosophy. I propose this paper as a contribution to such a new synthesis.

## 2. Philosophy and Natural Philosophy

### 2.1. What Is Philosophy?

It seems essential to first outline my position as to what philosophy and Natural Philosophy are and how they differ. Before addressing the status of contemporary Natural Philosophy, let us therefore try to answer the question posed in 1991 by Deleuze and Guattari: "What is philosophy?", "*Qu'est-ce que la philosophie?*" [11]. In their view, philosophy is neither contemplation, reflection nor communication. It is the cognitive activity of creating concepts in a domain of pure immanence, in contrast to science and logic which involve functions and observers, and to art which operates with percepts and affects. Most importantly, philosophy does not operate with propositions: the relations that compose the concept are not those of comprehension or extension but of ordered variation, processual and modular, pure events, real without being actual, ideal without being abstract. I can agree with these authors that standard logic has an 'infantile' conception of philosophy.

Concepts, hence philosophy, should not be confused with the energetic cognitive states-of-affairs in which they are found. “There is no energy; only intensities” in philosophy, whereas energy involves intensity in an extensive context. Taking this line of reasoning one step, the level of immanence itself is pre-philosophic, becomes philosophic under the influence of the concept and then evolves is a philosophic relation with non-philosophy. Finally, while the two domains—of immanence and event—are inseparable, philosophic concepts do not ‘intervene’ in scientific functions or functionalities and vice versa. I will introduce a similar demarcation, to use a term familiar to philosophers of science, to distinguish between philosophy and Natural Philosophy.

The philosophy of Deleuze illustrates the results of applying the concepts of immanence and transcendence without defining and including any dynamic dialectical relation between them. It constitutes a domain, governed by a binary logic of undetermined, idealized entities, Humean in its lack of effective interactions. In the domain of reality to which LIR applies, the existence of all beings depends and is defined by that of others. Infinities and infinitesimals do not exist, but are replaced by transfinite values, and immanent and transcendent aspects of phenomena are mutually and alternately actualized and potentialized. Thus, LIR can discuss philosophical issues in physical, dynamical terms that do not require recourse to any imaginary, abstract structures which to separate aspects of reality. The aspects that are considered ‘virtual’ or ‘possible’ in Deleuze are so ‘in philosophy’ but ‘in reality’ are instantiated as potentialities.

The answer to the question posed in 2.2 below by the contemporary philosopher of information and information ethics Rafael Capurro [12] is the following: philosophy deals with the question about reality as a whole stated by beings (ourselves) that finds ourselves in reality without having the possibility of a holistic view of being ourselves in reality and not beyond it. The fact that we are able to ask this question means that we have some kind of pre-knowledge about reality as a whole while at the same time this pre-knowledge is problematic, otherwise we would not ask the question and would not be able to become philosophers.

## 2.2. What Is Natural Philosophy? The Ontological Turn

I continue with Capurro’s response in the same format as above: Natural Philosophy deals with the question about nature as a whole stated by beings (ourselves) that finds themselves in nature without having the possibility of a holistic view of being ourselves in nature and not beyond it. The fact that we are able to ask this question means that we some kind of pre-knowledge about nature as a whole while at the same time this pre-knowledge is problematic, otherwise we would not ask the question and would not be able to become natural philosophers.

The question then changes to the difference between nature and reality as a whole, including fictions, non-verifiable beliefs and intangible objects of thought. Since the idea that classical Natural Philosophy evolved into science seems correct, we are left, for the domain of Natural Philosophy, a speculative interpretation of nature viewed in its entirety. This interpretation is, *ipso facto*, at a lower ontological level than the science which has largely replaced it. Much of the 20th Century linguistic turn, expressed in both analytical and phenomenological and residual transcendental traditions, is still visible in contemporary philosophy.

The reaction to this unsatisfactory state of affairs has been the reinstatement of realisms and materialisms of various kinds, associated today with the names of Derrida, Badiou, Zizek, and others. The ‘ontological turn’ in philosophy is a term of art that designates dissatisfaction with descriptions of reality based on analytical, semantic criteria of truth. Starting with Heidegger’s critique of hermeneutics and the basing of philosophy on human life, the ontological turn is a challenge to neo-Kantian epistemologies, and looks to what the structure of the world might be like to enable scientific, that is, non-absolute knowledge. Unfortunately, ontological theories have been hobbled by the retention of static terms whose characteristics are determined by bivalent logic.

In 2002 [13], Priest suggested that an ontological turn in philosophy was taking place, away from language in the direction of a contradictory nature of reality. However, Priest proposed paraconsistent

logic as appropriate to this turn. Lupasco anticipated this ontological turn by some 60 years, but his logical system lacks the epistemological limitations of paraconsistency.

We may thus say that contemporary philosophy is largely natural and realist: I note the landmark date of July 2012 and the Summer School in German Philosophy at the University of Bonn: “The Contemporary Turn in German Philosophy”. I have no difficulty in associating this group of thinkers with the term ‘natural philosophers’, but I do not believe that the issue of what is natural has been exhausted by them.

The most important point for me is that Natural Philosophy tells us something real about the world that is consistent with our best science, physical, biological and cognitive. Speculative philosophy can always re-illuminate ‘eternal’ questions such as what it means to be a thinking being in a non-thinking environment, but it cannot in itself be other than part of philosophy *tout court*. This non-Natural Philosophy, to repeat, exists for ‘natural’ reasons: it is a natural necessity for human beings to create it, by a natural process, but it is not part of nature *qua* content.

### 2.3. Nature and Non-Nature: Belief

Capurro suggests that we humans are the *tertium datur*, the included third (see below), living the paradox of a being who is able to ask questions about the whole of reality (of nature, the soul, god) from a perspective that is the negation of such an ‘absolute’ perspective. The kind of ‘relative’ transcendence (going ‘beyond’ but remaining ‘inside’) that is characteristic of philosophy (as different from theology and myth) is that this philosophical perspective on the whole of reality (or nature, the soul, god) is the one of indeterminateness or ‘nothingness’. This paradox, our own way of existence, might ‘explain’ while we, humans, asking some kind of true and permanent knowledge about what is at stake concerning what is, was, will/can be, have looked and still look for answers in myths and religions.

The result is not an answer but a dead end. It is a fact that people who believe in a transcendental deity, outside and/or including nature believe that it is the true reality and all else is illusion. Realists such as the writer think that the believing of such believers is real but its objects are illusions. Neither side can accept that the other is even partly correct without invalidating their respective theses. Since such absolute polarization is not a part of nature, it cannot be part of any Natural Philosophy. The demarcation problem is simpler than that between science and non-science.

### 2.4. A New Role for a New Logic

This sub-Section outlines my core thesis: I take the Logic in Reality mentioned above and see how it might provide a criterion for distinguishing between Natural Philosophy and philosophy in general. Obviously, if one takes ‘nature’ to be all of ‘reality’, there is no difference between them. I think it is more useful to define the following three domains and their respective theories and logics:

- Philosophy
  - The non-natural domain: fictions<sup>1</sup>, beliefs, especially, transcendental beliefs, computational programs
  - Epistemology
  - Classical bivalent/multivalent propositional logic, present or ‘projected’ (Sherlock Holmes behaves logically)
  - Being (abstract: the being of Being)
- Natural Philosophy

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<sup>1</sup> A discussion of fictionalism is outside the scope of this paper.

- The natural domain of physical and mental reality
- Ontology
- Dynamic logic of processes (Logic in Reality—LIR)
- Becoming (real; the link to ‘Being’)

There is no sharp cut between these domains: in some one perceives that epistemology is dominant, but there is also a longing for ontology, while propositional/predicate logic is largely retained.

I will refer below to aspects of Natural Philosophy in the work of some contemporary thinkers coming from biological and social scientific fields, such as Terrence Deacon [14] and Wolfgang Hofkirchner [15], who almost by definition work at the interface of Natural Philosophy and philosophy. It is not by accident that these people, as well as myself, are involved in the development of the science and philosophy of information and their naturalization.

It is now time to present the basic principles and formalisms of Logic in Reality, as described in detail in my 2008 book, *Logic in Reality* (Dordrecht, Springer) [9]. We will see among other things that the boundaries between the indicated domains should not be considered absolute, and why the word ‘pure’ should be banished from discussion.

### 3. Logic and Logic in Reality (LIR)

#### 3.1. *The Logical Line. Change*

Part of the difficulty for the Lupasco concepts and LIR to gain acceptance is that it requires changes in perspective not only in the content of logic and logical analyses and the process of using it, but in our common-sense views of parts and wholes, sets, categories, truth, determinism, causality and time and space, all based on a more complex view of the principles underlying thought [16]. What is gained is a better perception of the dynamics of first-person experience, consciousness and other complex psychological and socio-economical processes, creativity and art.

The discussion of Logic in Reality, as it has emerged from the pioneering work of Lupasco, is formulated in this paper in language I have used previously, as it remains the best I have found to make this unfamiliar approach understandable. I am encouraged to note that at least two of the contributions to this Special Issue include references to LIR.

#### 3.2. *The Principle of Dynamic Opposition: The T-State*

The antagonistic dualities of our world can be formalized as a structural, logical, and metaphysical principle of opposition or contradiction instantiated in complex higher-level phenomena (Principle of Dynamic Opposition—PDO). The fundamental postulate of LIR is that for all energetic phenomena (all phenomena) alternate between degrees of actualization and of potentialization of themselves and their opposites or ‘contradictions’ but without either going to the absolute limits of 0% or 100%. The point at which a logical element and its opposite are equally, 50% actualized and potentialized is one of maximum interaction from which new entities can emerge. It is designated by Lupasco and Basarab Nicolescu, the physicist colleague and major continuator of Lupasco [17], as a ‘T’-state, T for included middle or third (*Tiers-inclus*). I use the concept of T-states to evaluate both philosophical and scientific theories, including patterns of human individual and social behavior. A dynamic systems view can be used to focus on the feedback in all natural processes.

#### 3.3. *Philosophy and the Philosophy of Mind*

Regarding philosophy as such and the vast subject of the philosophy of mind, I will restate my criticism [18] of philosophical arguments. They often depend on some form of absolute separability of opposing or dichotomous terms, which use, in one way or another, the principles of binary logic which exclude the functionality of complex interaction.

For a philosophy of mind, the central problem is to show how physical tokens, the neuro-physiological processes occurring in the brain, can give rise to mental tokens that retain the properties of intentionality, 'aboutness', individuality and some level of causal powers or functionality. I have discussed the Lupasco conception of the operation of the human mind on which these capacities may be based in an article forthcoming in an *APA Newsletter* [19].

### 3.4. *Insights from Chemistry*

For clarity, I should explain that my ideas of process and change have been influenced by my training as a chemist. In chemical reactions one has, at the same time, reactants; an environment, for example a solvent in a reaction vessel; energy being added as heat or light; and some of the reactant atoms or molecules absorbing that energy to move toward a transition state from which, given favorable thermodynamic criteria, most of them will become products. However, also at the same time, some products are absorbing sufficient energy to move in the opposite direction and re-become reactants. I claim that not only is this a picture of what happens in other physical and biological sciences, but also in real cognitive and social situations. No description of processes, not relations as such but changes in relations or ideas, theories, etc. can be less complex, in a thermodynamic world, than this one from chemistry.

In more logical-philosophical terms—those of Lupasco—the movement described is from potentiality to actuality, from the point of view, say, of reactants to products, but this movement, to repeat, is not total and is always accompanied, even to a minor degree, by the opposite movement from actuality to potentiality, the 'regeneration' of reactants. We can always change our mind—twice. We do it from a point, a T-state in Lupasco or a transition state in chemistry—where the driving forces for change in direction are approximately equal.

I claim that the LIR approach can redefine the domains of philosophy: theories of reality which follow a bivalent or multivalent logic of propositions are satisfactory for philosophy, idealist or reductionist-materialist. The domain of Natural Philosophy can only be described by a logic of real processes that shows the origin and evolution of change.

### 3.5. *Scientific Structural Realism (SSR)*

I have positioned LIR as a theory of reality by comparing it to formulations of other realist theories. The conception of structures in LIR as real processes permits an alternate to Scientific Realism which I defined in [9] as a kind of scientific structural realism (SSR). The ontological structure of reality of LIR supports a non-naïve and above all non-absolute scientific realism, so that a theory of scientific structural realism is possible that includes the best of both worlds.

Details of this approach, including the relation to Ontic Structural Realism (OSR) are provided in my book. Basically, the answer to the question asked by Lupasco—"What is a structure?" [20]—is that structures also must be looked at as processes-in-change, dynamic entities (cf. [21,22]).

The metaphysics of LIR provides for a fundamental vagueness in nature. Any semantic conception, such as that of Kuhn, according to which the most basic laws in a theory or paradigm are true in some absolute sense is excluded as anti-realist.

### 3.6. *A New Synthetic Philosophy*

LIR statements look like what are termed synthetic statements, that is, ones whose truth depends on matters—in particular, contingent facts about the world—to which I have ascribed a certain dialectic structure. Such statements are to be distinguished from analytic statements that are true by virtue of the meaning of their constituent terms alone.

LIR thus provides support to a naturalistic, causal-role theory of mental content and a naturalistic means of drawing the analytic/synthetic distinction. This can be part of Natural Philosophy, even if a 'pure' analytic theory cannot be. LIR always defines a real relation between the intensional notions or aspects of a phenomenon and the extensional ones. Analytic claims can provide insight into external

reality, but only if coupled with a non-semantic theory that provides some basis for explanation of the coincidence between our concepts and the properties or real phenomena of the world. By starting from the side of the phenomena, LIR permits progress toward a new 'synthetic' philosophy that if not entirely is more within the domain of Natural Philosophy<sup>2</sup>.

#### 4. Conceptual Precursors of LIR in Relation to Natural Philosophy

To support my new approach to and content of Natural Philosophy, reference needs to be made to its precursors to see where the LIR Principle of Dynamic Opposition might apply. Precursors include both non-contemporary and contemporary thinkers, and both philosophers and scientists. I will not attempt to review the entire history of knowledge from 'Heraclitus to Hegel to Heidegger', recognizing that significant elements of Logic in Reality are to be found in all of them. To repeat my thesis, to the extent that a component in these theories is present explicitly or implicitly equivalent to Logic in Reality, the relevant doctrine is *ipso facto* in the domain of a Natural Philosophy.

##### 4.1. An Historical Line: Gare on Fichte, Schelling, and Engels

The contribution of Arran Gare to this special issue [24] suggests a dialectic line of development of Natural Philosophy from Hegel through Fichte, Schelling, and Engels to Whitehead. He has set himself the objective of specifying the difference between natural philosophy and science in order to give the former a more functional role for making progress in knowledge. My approach in this paper can be summarized as specifying the difference between philosophy and natural philosophy in order to give the latter a more functional role for making progress in knowledge. In my approach, what is emphasized is the similarity or overlap between natural philosophy and the non-experimental sciences.

I refer the reader to Gare's article, but I will cite here some highly suggestive passages in the work of these authors that foreshadow the basic principles of Logic in Reality. Despite the 'bad press' which contradiction usually receives, Fichte said quite clearly [25] that the "thing-in-itself . . . is a contradiction though as the object of a necessary idea it must be set at the foundation of all of our philosophizing, and has always lain at the root of all philosophy and all acts of the finite mind, save only that no one has been clearly aware of it, or of the contradiction contained therein. This relation of the thing-in-itself to the self forms the basis for the entire mechanism of the human and all other finite minds. Any attempt to change this would entail the elimination of all consciousness, and with it of all existence." It is this positioning of the concept of active, ontological contradiction, in Fichte and Lupasco that defines its place in Natural Philosophy.

As Gare points out, it was dialectics as developed by Schelling that "provided the forms of thinking required to develop natural philosophy". Schelling developed Fichte's notions of the appreciation of subjects as activities (JEB: processes) rather than objects and of cognition as the process by which nature has come to comprehend itself. The notion of synthesis rather than analysis is central, and so, as in Lupasco, is opposition. "Thought is inherently synthetic, Schelling argued, and begins with a genuine opposition between thought and something opposing it, or between other factors within thought." As in Lupasco, the dynamic basis is provided for emergence from a state of contradiction of a "new synthetic moment that can be treated as a product or factor in the next level of development". I only suggest, based on the principles of LIR, "product and factor". Emergent entities, as 'products', enter into oppositional relations as 'factors'. Lupasco specifically refers to his method as a 'dialectomethodology' which he saw as requiring the identification of the dialectically opposing forces operating in a process, their reciprocal degree of actualization and potentialization and the direction of the trend toward predominantly one or the other, as noted in Section 3 above.

It is equally relevant for this study to note the central place Gare gives to the unfinished 1883 work of Friedrich Engels, *Dialektik der Natur*. It can be described both as a philosophy of the natural

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<sup>2</sup> Let us not forget, at this point, from Schroeder's charter for *Philosophies*: "Synthesis through Diversity" [23].

sciences and a Natural Philosophy, demonstrating not the identity but the overlap of these concepts. As summarized by a Soviet writer, Boniface Kedrov (in a curious work found in an East German bookstore in the 1980s [26]), Engels gives ample justification for considering dialectics as a fundamental natural as well as epistemological process: “What is called objective dialectics is found throughout nature, and subjective dialectics, dialectical thought, only reflects the dominance, again throughout nature, of movement by opposition of contraries.” This statement could be considered a philosophical foundation for the Natural Computation of Dodig-Crnkovic [27] (see below). Engels said that a dialectical method was the only one that could enable an understanding of reality. Engels made dialectics the basis of his and Lenin’s materialism, but we do not need to follow him here. It is ironic that Lupasco adopted and developed the logic of this dialectics coming from a bourgeois background of *petite noblesse*. His rehabilitation of dialectics, however, was routinely attacked and denigrated (as well as plagiarized) by some of the armchair Marxists of the French *intelligentsia* such as Yves Barel. As for Lupasco, the point of departure for knowledge for Engels was the “qualitative aspect of things and phenomena and not their quantitative side”.

In his further citations from the *Dialektik der Natur*, Gare suggests a relation to Lupasco with which I agree: “Dialectics is the science of universal interconnection, of which the main laws are the transformation of quality and quantity—mutual penetration of polar opposites and transformation into each other when carried to extremes—developments through contradiction or negation of negation—spiral form of development.” Logic in Reality is a way of avoiding the dogmatism of Engels’ thesis when it is stated this rapidly: the transformation of the polar opposites operating in complex systems is never complete; extremes of 0 and 1 are never reached except in trivial cases. Contradiction inheres in physical processes, and negation of negation remains at the level of linguistic logic. The concept of spiral form of development is an absolutely essential one which I have described in detail as a consequence of Deacon’s concepts of “incomplete nature” [28]. I will discuss the work of both Whitehead and Deacon below.

#### 4.2. A Scientific Line: Gödel, the Philosophy of Physics and LIR

Contemporary Natural Philosophy cannot be discussed without reference to the most important developments in 20th Century physical science: quantum physics, including the Pauli Exclusion Principle; the uncertainty principle of Heisenberg; and the Gödel principle of the reciprocity of completeness and consistency in mathematics. I call attention in particular to the work of Sklar on the Philosophy of Physics [29]. Let me state the relation between quantum mechanics and Logic in Reality apodictically: the superposition of quantum states is isomorphic to the T-state in LIR at macroscopic levels of reality. Together with uncertainty, a physical basis is provided for the Lupasco physical-logical Principle of Dynamic Opposition. As I have shown in [9], LIR can be usefully compared with quantum logics, but further conceptual changes are necessary to make quantum-type logics applicable to macroscopic change. It should be clear that an explanation of the experimentally demonstrable quantum features of the world will (still) require a radical rethinking of our metaphysical picture of it. At the latter level, the one of greatest generality, the definition of some principle that is missing or has been ignored would have major consequences for the future of ‘reason’ in the broadest possible sense. As indicated above, there may exist aspects of physics, expressed in the PDO, that are already accessible and could fit this description. In a recent paper [30], Bishop and I have discussed how Heisenberg’s conception of potentiality, his *res potentiae*, should apply at a macroscopic level.

In his ontological approach to modern physics with regard to the development of field theories, Cao [21] sees the synergy—‘mutual penetration’—between physics and metaphysics, considering that physics has also provided us with a direct access to metaphysical reality. Cao describes a debate, over the nature of energy suggest: “What if energy is taken as substance *with the new feature of being always active, always changing its form while keeping its quantity constant* (emphasis mine)? Then energeticism would seem to be a precursor of James’s functionalism and Whitehead’s ontology of

process.” This doctrine is close to LIR and perhaps should be how a philosopher could appreciate the first law of thermodynamics.

My interim conclusion is that a philosophy of physics embodying these principles lies comfortably within Natural Philosophy. The links to nature are extensively described in a crucial 2012 compendium by Kuhlmann and Pietsch: “What Is and Why Do We Need Philosophy of Physics?” [31]. Very much in the spirit of my analysis is the authors’ thesis (ii): the boundary between physics and philosophy of physics is blurry, particularly with regard to foundational questions (e.g., the physical ‘ground’ of existence).

#### Nature’s Metaphysics?

As an anti-thesis to the concepts developed in this paper, I cite a recent book by Alexander Bird which has the title of this section [32]. Bird defines the only fundamental natural properties as ‘potencies’ which, linguistically at least, are akin to potentialities. This dispositional monism gives him the foundation for the—necessary—laws of nature. As I stated in [9], the contradictorial relation between actuality and potentiality in LIR thus provides arguments against attacks on the reality of ‘potencies’, defined as dispositional properties that include potential manifestations. My demonstration that what is potential as well as what is actual is real answers the critique that only the actual is real. The modal argument (*possibilia* are not things that exist in other worlds but not in this one) against the objection that potencies involve unrealized manifestations of possibilities that, accordingly, violate naturalism is supported by a view of unrealized possibilities as real potentialities, but ones whose reality does not depend on their manifestation if this is prevented by an actuality.

Bird sees the elimination of invariance as a desirable feature, part of a general strategy of eliminativism: symmetry principles and conservation laws may be eliminated as being “features of our form of representation rather than features of our world requiring to be accommodated within our metaphysics”. I do not contest—here—Bird’s argument. I consider it an example of the Lupascian standpoint possible, namely, that a total separation of the world and our representations of it is neither necessary nor desirable. However, I would exclude his overall thesis from the domain of Natural Philosophy.

With this scientific–philosophical background, let us now look at one of the areas of major interest to contemporary philosophy, that of process.

#### 4.3. The Philosophy of Process

An area to which it is natural to apply the logical system outlined above is that of process. To the extent that it refers to real, physical and mental phenomena, placing the philosophy of process in the domain of Natural Philosophy should be self-evident. That it is not entirely so is a measure of the problem which this paper addresses. I analyze here the work of two contemporary philosophers.

##### 4.3.1. A. N. Whitehead: Consistency, Coherence, and Concrecence

Curiously, the criteria proposed in this paper place Whitehead’s concepts of consistency and coherence both outside and inside the domain of Natural Philosophy. As summarized by Soelch [33], Whitehead supplements James’s notion of an empirical, rational but subjective domain by a logic, but this logic is based on not more than standard rules of inference and the law of non-contradiction. I consider that this doctrine remains here at the level of epistemology, that “the fundamental ideas in terms of which a scheme is developed presuppose each other, so that in isolation they are meaningless”. I note a reference to propositional truth. However, Whitehead’s focus, anticipating phenomenology, is on the “texture of human experience”. Coherence is also defined as the body (*sic*) of our theoretical knowledge, but at the same time it is “a basic inventory of concepts”, an inert Peircean classification.

Much closer to NP in my view, which I discussed in [10], is Whitehead’s concept of ‘concrecence’, extended in his *Process and Reality* [4] toward real systems: “The coherence, which the system (organism) seeks to preserve, is the discovery that the process, or concrecence, of any one actual entity involves

the other actual entities among its components. In this way the obvious solidarity of the world receives its explanation.”

#### 4.3.2. Nicolas Rescher

The foundational work of Rescher on process metaphysics and process semantics is well known [5], and I have summarized my views of it elsewhere [9]. Rescher’s mission for process philosophy is “enabling us to characterize, describe, clarify and explain the most general features of the real.” Further, he relates his view of the processual structure of reality to energy, the entities of quantum mechanics entering into more and more complex arrangements.

In an Appendix to his [5], Rescher proposes a Process Semantics as an alternative to standard predicate logic as the conceptually most versatile and philosophically most fundamental tool for reasoning and understanding reality. His semantical (*sic*) strategy dispenses with object/subject terms and replaces them with verbs and adverbs indicative of processes. According to Rescher, these are capable of accomplishing what a semantics of individuals can do with properties and relations. His process semantics is thus at the basis of his ideas of process philosophy and process metaphysics. What he called the mainstream logical theory of the West, which takes an approach to truth that is committed to its static fixity, was and is unable to meet this challenge.

I can agree here with Gare’s suggestion [34] that the resulting process doctrine looks like a logic whose terms are those of processes, including living processes. From an LIR standpoint, the notion of logic can be extended to include Gare’s construction, which goes beyond Rescher’s. The latter states that “dispositional processes accomplish exactly the needed job of rendering predicational terms of the form  $G[\text{the-}x(Fx)]$  contingently true or false”. We are thus clearly in a truth-functional, linguistic domain. Logic in Reality of course is about nothing but properties and relations and their dynamics, but it is in a non-truth-functional, non-linguistic domain. Rescher does call attention to the lack of fixity of his conception of truth and the fluidity and analogue character of natural processes. On the other hand, he suggests their “kinship” to the continuities captured by differential equations, which is not adequate, as no reference is made to the continuity-discontinuity dualism.

Going now from Process Semantics to his major theme of Process Metaphysics, Rescher correctly states that matters of cognition and communication cannot be substance-like ‘things’, but are processual phenomena. These are described, we would now say, by the science and philosophy of information (see for example one of my papers with Wu Kun [35] and the discussion below). His processual view of scientific inquiry is equally important for the break it makes with the standard philosophy of science. As a process metaphysics which includes all these ideas, Rescher’s philosophical ‘system’ does provide a distinctive and illuminating window on the world. He himself seems to have had an intuition of the transitional character of his doctrine and this is where I would position him, somewhere ‘between’ philosophy and natural philosophy. LIR describes change in terms of dynamic opposition and captures some of the features of process described by Rescher. In the absence of any other formal logical system that does so, LIR can be seen as the preferred logic of, in and for process. With this addition, we may consider the philosophy of process as being in the domain of Natural Philosophy.

#### 4.3.3. Johanna Seibt

Among contemporary philosophers, Johanna Seibt, a student of Rescher, has extended the work of Whitehead and provides a basis for its potential naturalization into Natural Philosophy. I say ‘potential’ because I do not believe Seibt has fully achieved a naturalization in the terms of this paper. Her standard categorial entities in this formal ontology are theoretical entities with only axiomatic characterization. The only things to which she says we are ontologically committed by the use of abstract singular terms are linguistic entities, without explanatory force. In Lupasco, the term ‘explanatory force’ of non-linguistic entities (items) is not only a metaphor.

In correcting the ‘The Myth of the Given’, Sellars says [36] that non-propositional items cannot serve as what is given, but inferential relations are always between items with propositional form.

However, even Sellars, I would like to believe against his will, is forced into making ‘distinguos’—yes or no positions due to the absence of a principled manner in which they can be seen as operating jointly, synchronically, or diachronically as the case may be.

I have suggested that the exclusion of contradiction from logic has overly constrained its applicability. Similarly, Seibt has shown how characteristic Aristotelian presuppositions have constrained ontology to a substance paradigm. From her standpoint, Seibt sees a trend in ontological theories that leads from traditional substance-ontological schemes operating with concrete, particular, static, and ‘causally separate’ entities (including abstract and general entities) to schemes whose basic entities are concrete but non-particular, dynamic, and ‘causally interlaced’ or ‘overlapping’. LIR implies a dynamics for moving from the first group of entities to the second and a physical meaning to ‘interlaced or overlapping’. This founds a metaphysical to and accordingly to a further new ontology, one of which the physical dynamics are an explicit part. Only such an ontology would meet my criteria for a role in Natural Philosophy.

#### 4.4. Information Ethics and Digital Ontology

Rafael Capurro has made pioneering contributions to the fields of the science, philosophy, and ethics of information based on his unique philosophical perspective of the position of humankind in the world. For Capurro, the field of information ethics defines the essentially social nature of meaningful information. In his formulation of a digital ontology [37], Capurro emphasizes that our ways of understanding ourselves and the world cannot be separated from the effects of the world on us but are radically grounded in them. He is in effect saying “ontology is not a discipline distinct from ethics; it is ethics in its original sense”. In today’s world, ethics and information ethics cannot be considered independently of one another.

From my dynamic logical perspective, Capurro’s critical Heideggerian concepts of human existence have been naturalized, brought into a non-reductionist relation to science, and can be considered part of Natural Philosophy. They can be seen as part of a convergence of science and philosophy directed toward a revitalization of the concepts of the commons and of the common good.

#### 4.5. Philosophy in the Flesh

In their major 1999 study [2], George Lakoff and Mark Johnson make a devastating indictment of standard philosophy and—analytical and formalist philosophy in general, and they give full ontological value to the constructs of cognitive science. “The results of second-generation cognitive science stand squarely opposed to the analytic and formalist philosophical traditions . . . on (1) the embodiment of concepts and of mind in general; (2) the cognitive unconscious; (3) metaphorical thought; and (4) the dependence of philosophy on the empirical study of mind and language.” Their position on the relationship between science and philosophy is similar to the one taken in this paper: empirical scientific results, especially through an informational perspective, take precedence over *a priori* philosophical theories.

In their conclusion, the authors make a trenchant case for the importance of metaphor in philosophy, to ensure that “philosophical theories work”. Metaphorical metaphysics “is not some quaint product of antiquated and naïve philosophical views. Rather, it is a characteristic of all philosophies, because it is a characteristic of all human thought.” “Metaphors are the very means by which we can understand abstract domains and extend our knowledge into new areas.”

I can agree with basically all of the critique of Lakoff and Johnson—their embodied realism—as an absolutely necessary part of a philosophy that is, as they say, creative and synthetic. I have some questions about the role assigned to metaphor. By saying that the logical structure of Aristotle’s reasoning is metaphorical, and that his ontological commitments come out of the metaphors, our authors seem to have inversed ontological priority. They make metaphors—metaphorically—do more philosophical work to bind thought, knowledge, and imagination into an organic whole than I think they are capable of. I will refer again to their work in the Section 5 on Naturalization and Merleau-Ponty.

#### 4.6. *Dé-Coïncidence (Decoïncidence)*

The French philosopher and sinologist François Jullien has recently coined the term '*dé-coïncidence*' (decoherence/incoherence) to describe the dynamics of the evolution of cognitive and social processes [38]. Currently discredited theories of mind postulated quantum phenomena occurring in microtubules in the brain as the physical basis of thought. In fact, these would be 'washed out' by thermal noise, that is, they would no longer be coherent.

Jullien associates, very much in the spirit of Lupasco, decoïncidence with temporality, emergence, symmetry breaking, and the foundations of ethics in opposition to the coherent inhuman world of quantum phenomena, timeless, changeless, and ethically neutral. One must follow the advice of von Bertalanffy and avoid pushing analogies to far, but in the context of Jullien's deep knowledge of Chinese philosophy and logic, the coincidences (*sic*) between the principles of LIR and his concept are striking.

### 5. Phenomenology and the Naturalization of Phenomenology

The reworking of some additional subjects within Philosophy seems necessary to eliminate what amount to category errors, ascribing to natural phenomena logical properties which are essentially fictions. These subjects are thus the main targets for the naturalization proposed in this paper. I will now discuss how this grid might apply to them, in other words, 'move' them to Natural Philosophy where possible. The precursor to naturalization as a process [39] was 'scientization', defined as the incursion of empirical science into areas of knowing previously the purview of theology and philosophy. An example of this is the attempted naturalization of intentionality [40], which has been only partially successful. If one looks explicitly for precedents to naturalization in philosophy, one finds that the term is generally used to describe a kind of grafting of philosophy onto science studies. This conceptual dead end suggests that the entire domain requires reconceptualization.

#### 5.1. *Husserl and the Naturalization of Phenomenology*

In contemporary philosophy, phenomenology occupies a strange position: on the one hand, it seems to place major ontological value on appearance while at the same time denying access to it by science. Perhaps it is best seen from an historical standpoint as a reaction, perfectly understandable in the 20th Century, to the hegemony of reductionist scientific views of a universe in which a transcendental deity no longer had a place.

The 'naturalization of phenomenology' might however be considered an oxymoron to the extent that phenomenology was designed by Husserl to exclude physical reality. My view of physical reality is simply the world independent of our thought processes which are nevertheless part of it and without which it would not have meaning), as in the weak objectivity of D'Espagnat. Husserl's approach of focusing on the unique lived character of experience available to individuals has led to the familiar definition of phenomenology. Familiar, also, is Husserl's later bracketing of the question of the existence of the natural world and its relation to experience vs. a realist ontology. As discussed below, the informational approach leads to alternate, and from an LIR standpoint preferable, descriptions of the co-existence of meaning and non-meaning in the world.

In the *Naturalizing Phenomenology* compendium of 1999, Roy [43] confirms that Husserl's phenomenological theory of intentionality is based entirely on the assumption that "truly adequate characterization of intentional phenomena can only be achieved by renouncing all forms of naturalism, both ontological and epistemological." I obviously agree with Roy that this is too high a philosophical price to pay. Although in Husserl every intentional state is conceived as one entity mediated by another, his relation of interpretation resembles that of Peirce with an ontological 'cut' between the interpretation and its intentional correlate. There is 'identity within difference', but not semantic, in my terms real, interaction between them.

### 5.2. Semiotics: Peirce and Brier

The semiotician Sören Brier has claimed that the semiotics of Charles S. Peirce can deliver the missing philosophical framework for phenomenology through his semiotic conception of a fundamental triadic structure of the universe. Semiotics is a transdisciplinary doctrine that studies how signs in general—including codes, media, and language, plus the sign systems used in parallel with language—work to produce interpretation and meaning in human and nonhuman living systems such as prelinguistic communication systems. For Peirce, a sign is anything that stands for something or somebody in some respect or context.

Sören Brier has pointed out the weaknesses in much of standard philosophical and sociological thought in general and phenomenology in particular. He thus writes [44] that Husserl, Heidegger, Merleau-Ponty, and Luhmann were unsuccessful in developing a proper philosophical framework for phenomenology. They did not offer any adequately deep picture of things in themselves in relation to appearance. Thus both Wu Kun (see below, Section 8) and Brier state that Husserl's transcendental idealism makes no contact with the world or the natural sciences. In particular, Wu has provided a unique analysis of Husserl from an informational standpoint [45]. I will simply reiterate here his key conclusion, namely, the complexity of human individual and social existence and experience cannot be captured by reference to a "life-world" and "intersubjectivity" that exclude the detailed functional role of information, information processing and the operation of the physiological and psychological structures necessary for that processing.

Peirce's introspectional method leads him to ascribe a foundational role to chance and spontaneity as causal factors. The subsequent classification of reality into "Firstness, Secondness and Thirdness" follows. I have argued that Peirce's system remains one of classification of phenomena in terms of representation by signs and symbols. It adds nothing that helps us understand the ontological basis of the way the world evolves. Signs obviously refer to existing therefore natural objects, but they are abstractions from them, and the corresponding relationship is not natural-philosophical as no dynamic, ontological relations obtain between the entities involved.

The above considerations are the basis of Brier's thesis outlined in his major book *Cybersemiotics* [44] whose sub-title is "Why Information is not Enough?". My reply is that semiotics is not enough since it does not incorporate in its 'flesh', to use the Merleau-Ponty and Lakoff concept, the dynamic, energetic changes from actual to potential, present, and absent that the term 'information' refers to.

### 5.3. The 'Flesh': Merleau-Ponty and Lakoff and Johnson

The contribution of Merleau-Ponty and his existentialist followers can be seen as a necessary reaction to the transcendentalism of Husserl. In his *Phenomenology of Perception*, Merleau-Ponty emphasized the role of the body in human experience. In the terms of *Logic in Reality*, his body-image is a kind of "included middle" between the mental and mechanical-physical domains. The human subject is inseparable from both his body and the world. Arran Gare has provided recent [47] authoritative discussion of Merleau-Ponty's trajectory which led him ultimately to embrace natural philosophy as the framework for his thought.

Unfortunately, by focusing on the human body (the 'flesh') as the primary philosophical entity, Merleau-Ponty effectively eliminated any foundational role for the properties of the underlying physical components of the 'flesh'. In my view, these properties that are not only consistent with consciousness and life but underlie their emergence as real and not epiphenomenal.

It is perhaps more than anecdotal to note that in a competition for a key position in the *Collège de France* in the 1950s, Merleau-Ponty was chosen over his contemporary rival—Lupasco. The marginalization of Lupasco can be dated to this event. As I have suggested in a paper in French [48], it is high time for this 'noble' marginalization to end. Finally, as I have discussed in another reference to Capurro's work [49], phenomenology should never, *pace* Husserl, have been conceived of as being a science in the first place.

#### 5.4. Speculative Realism: 'Ends'

The basic concept of this paper is that the natural philosophical stance is augmented by inclusion of the logic of Lupasco outlined above. One of the consequences of my interpretation is that it becomes otiose to talk about the 'end' of phenomenology, like Sparrow, as in Sparrow's Speculative Realism [50] or even of the end of philosophy, as Heidegger famously did. If there is an 'end' to something, it is the splendid isolation of philosophy from science that amounts to a simplistic idealistic position. Philosophy, as opposed to phenomenology retains some transcendental aspects as essential to its existence as a domain of knowledge, even if concessions to satisfactory aspects of the scientific paradigm may have to be made. Philosophy and Natural Philosophy retain their specificities as disciplines within a transdisciplinary framework of which science and LIR are a part. The LIR categorical feature of non-separability denies the traditional philosophical division between theory and practice and looks for ways in which they overlap and inform one another. This process, and the mental movements it entails, are those which take place when a logic—LIR—is and should be considered as part of knowledge as a whole, including science, in what I have called the 'logical rejunction' of logic with knowledge initiated by Lupasco [51].

Let us now see, therefore, what a Philosophy of Information in relation to phenomenology and Natural Philosophy might bring to the table.

### 6. Luciano Floridi: Information Philosophy and Informational Structural Realism (ISR)

The concept of a specific Philosophy of Information was introduced by Luciano Floridi in Europe in order to bring some order into the many theories of and approaches to information. The debate went back to Wiener's "proto-physical" view of the nature of information—information is information, not matter or energy. LIR approaches the realist/anti-realist debate from a logical and scientific standpoint in which information as data or propositions are not primitive. From my perspective, Wiener's statement can no longer be accepted without some additional qualification. If the important properties of non-digital information are processual, causal, and value-bearing, in the LIR ontology, it is also energetic in nature.

I have discussed Floridi's Informational Structural Realism (ISR) [52], which I consider is supported by LIR at several points, in detail in my book, *Logic in Reality* [9] and in [53] and I will not repeat them here. I believe ISR is a useful tool to block radical anti-realist and anti-scientific scepticism. ISR, however, lacks the ontological dimension of LIR and cannot be included in the domain of Natural Philosophy. This position is supported by Beni in [54].

In the next section, I will show why I believe the Philosophy and Metaphilosophy of Information developed by Wu Kun in China can so be included.

### 7. Wu Kun and the Philosophy of Information

Working for over thirty-five years on a Philosophy of Information (PI) that includes an informational theory for all major fields of knowledge [7], Wu recovers dialectics as an appropriate strategy for philosophy and science, including social and political science. The basic insight of his Philosophy of Information is that the concept of objective reality = objective existence is too poor to describe the informational world. A proper new ontology and worldview is needed to describe the phenomenological characteristics of that existence. The development of Wu's thought, in and of itself, is equivalent to an 'emergence' from the ideological dialectical materialism of standard Marxism-Leninism. A more appropriate designation for Wu's doctrine is 'dialectical realism', a concept associated with the work of Theodor Adorno.

Wu's new informational view of the need for unification of critical disciplines and their formulation as a metaphilosophy constitute a major contribution, as yet little recognized outside China, to any general theory of information [55,56]. His theories constitute part of a new transdisciplinary paradigm, in which information has a central role in the transformation of the society and its approach

to knowledge and the classical separation of the academic disciplines. In fact, Wu's approach constitutes and new, original and in my view necessary critique of the bases of modern philosophy as a whole.

In [57], Wu repeats his conviction that an informational ontological doctrine would provide the foundation for change in all other areas of philosophy, including epistemology. This statement of a new "open problem" has been addressed by Wu and the writer in a compendium relating information and the 'quest' for transdisciplinarity [58]. Our paper suggests convergence of science and philosophy in the area of information, and we propose reasons why this could be a phenomenon defining the contours of the Philosophy of Science and Philosophy in general.

Wu's picture confers an ontological dimension to the categorial discussions of information theory that have been largely epistemological, for example, the Philosophy of Information of Luciano Floridi (see above). In the perspective of this paper, the complex physical and non-physical real properties of information place the philosophy applicable to them within a generalized Natural Philosophy. This approach is consistent with my view of 'information-as-process' set out in my 2014 paper [10].

### 7.1. Information as Process

In the LIR view, real informational entities are processes, binary and non-binary, that are not independent of and cannot be discussed without reference to the *a priori* non-binary transfers of energy that are their source, in some real situation, at all levels of reality. The LIR approach thus incorporates and provides for a relation between information as well-formed, meaningful and truthful data (Floridi) and information as real energetic processes. Information-as-processes can function as higher-level operators, capable of causing change on information-as-data and higher level entities.

The approach of the sociologist and systems theorist Wolfgang Hofkirchner approach to a Unified Theory of Information (UTI) [59] is to eliminate the absolute and in my view artificial separation between critical concepts of information in favor of a dialectical relationship similar to the ancient intuition of 'unity-in-diversity'. Specifically, his "UTI seeks a concrete-universal concept of information rather than an abstract one". Hofkirchner considers information as a "superconcept", which includes a group of overlapping concepts—such as message, signal, etc.—as they apply to communication, cognition and cooperation between human and non-human organisms. Hofkirchner asks how matter and idea, mind, information, etc. can be grasped as complements and with them information as a thing (a structure, a flow) or as a human construction. Hofkirchner gives a dialectical answer to the implied division between subject and object, suggesting that mind, and with it information, is of a different 'materiality' than 'non-emergent' states of matter.

From the LIR standpoint, mind and information can be seen as "complements" if one sees them as processes. Structure, flow and "human processing activity" all follow the same real, physical dialectics. If matter and information are differentiated in a "common genus", for LIR, that genus is simply energy, and within it both follow its logical patterns of evolution, avoiding the problems of the term "different materiality". Logic in Reality is, also, a logic of emergence or "emergent materialism". In this view, information is, *pace* Wiener, an energetic phenomenon that instantiates real contradictions.

My conception of information as process should not be taken to exclude other perspectives. Marcin Schroeder seeks [60] the structural characteristics of information—syllogisms—using a combination of philosophical and mathematical perspectives (one/many; Boolean algebra; lattices of closed sub-sets). Such structures can be carriers of some new qualitative properties of information, for example the level of information integration which reflects the mutual interdependence of the elements of a variety. Schroeder has called the lattices involved the logic of the information system, by loose analogy to quantum logic.

However, the basic logic of this approach is in my opinion still a logic of propositions or their mathematical equivalent. The qualitative properties of information which are described are formal; these structural characteristics have no meaningful implications for real phenomena beyond their (clear) formulation. Accordingly, they are not within Natural Philosophy in the sense of this paper.

It is, rather, non-Boolean algebras together with non-Kolmogorovian probabilities that are appropriate systems for analysis.

### 7.2. *Wu Contra Husserl*

Wu expressed his views of the critical role of information in 2011 [61]. As noted above, in the light of information theory, the weaknesses of modern philosophy, from Kant through Husserl become apparent. It is the existence of information, even more than, but in concordance with, the logic of and in reality (LIR), that breaks the traditional absolute separation of subject and object. As noted above, although Husserl found a way of beginning to describe the reality of consciousness, his one-dimensional phenomenological reduction maintains, in another form, the disastrous (for human society) polarization of standard bivalent logics. As a hermeneutic process, Husserl's bracketing is thus fundamentally flawed. My conclusion from this discussion of phenomenology is that in the informational terms of Wu Kun, it can be included in Natural Philosophy. In its initial formulation by Husserl it cannot.

In the work of both philosophers and neuroscientists such as Searle and Deacon as well as Wu Kun, the basic worldview of natural science, namely, that consciousness is part of nature is upheld. As is discussed below, the advantage of an informational standpoint, or 'stance', is that information serves as the unifying concept between the fields of physics, biology, neuroscience and mind. In this sense, the philosophy of information is a more scientific and reasonable explanation of the mechanism of human understanding than in phenomenology.

Following Wu, I propose an informational ontology in which we as humans have (self-evidently) access to "things-in-themselves" as a 'natural phenomenology' that is objective or better objective and subjective in its interpretation of the structure of the world. We live, also as indicated in the dialectics of Lupasco, by adhering to route on which "the natural noumenon's own movement explains the world".

Thus, functional and operational definitions of information have their role to play in practical applications. However, they fail to capture both the intrinsic dynamics of complex processes and the nature of information itself which is instantiated in them. For the understanding of knowledge and knowledge propagation, drastic modifications of points in standard epistemology, also foreseen in LIR, have to be made.

### 7.3. *The Science-Philosophy of Information*

The insights gained in the study of the unique scientific and philosophical characteristics of information are summarized in [58]. Wu's original idea is that what is taking place in philosophy is a 'scientification' of philosophy and a 'philosophization' of science, his terms for the convergence of the disciplines under the influence of the unique properties of information processes. The term Unified Science of Information has been applied to characterize the convergence, but this is not strictly accurate, as the convergent theory includes the Philosophy of Information as a proper part, without conflation. We therefore proposed the term Unified Science-Philosophy of Information (USPI) as the best possible description of this field.

The philosophical stance of USPI may be usefully compared to Hofkirchner's proposal [15] of a praxio-onto-epistemology (POE) as "a response to the current developmental requirements of humanity". According to Hofkirchner, (I invert his order of points) we need to (1) reflect the unity of the physical world by the unity of the world of knowledge; (2) the unity of the social world presupposes the unity of the physical world; (3) the survival of civilization itself depends on establishing a new world order, a unity of the social world. Traditional approaches are apparently stuck in the three disciplines of epistemology, ontology, and praxiology as alternatives. POE offers a transdisciplinary response for going beyond them. It is a synthesis, and a concept for inclusion in a new Synthetic Philosophy that resembles that of LIR and the USPI in this respect.

Wu and I concluded that what has been defined is both new content of the philosophy of science and new dynamics of the relations between a science and its philosophy. The dynamics of the

processes can be captured in the concept of a trend toward an Informational Metaphilosophy of Science as the most appropriate model of knowing and reasoning. This Philosophy-Science justifies a new non-reductionist view of the world in which it is ethically impossible to maintain any scientific basis for economic, social or ethical exclusion. The use of this doctrine to promote the development of an information commons and the common good is thus a moral as well as a methodological imperative.

From the point of view of this paper, everything that could be considered part of such a Unified Science-Philosophy of Information, or which could be described as a science-philosophy in general would be part of Natural Philosophy. The Philosophy of Science itself could thus also be segmented based on the same criterion.

#### *7.4. The Philosophy of Natural Computation*

Computational approaches are currently at the center of developments in the theory and philosophy of information; what form of computationalism is most adequate is a metaphilosophical issue. The theory comes in two major forms, (1) pan-computationalism or strong computationalism, which includes statements that the universe operates like a computer; and (2) a weaker form, developed by Gordana Dodig-Crnkovic [27], informational or info-computationalism (ICON) which reflects Floridi's view of the universe as an informational structure (see above), in which natural computation governs the dynamics of information.

Natural computation represents implementation of physical laws on an informational structure within a living system. Her work thus presents a synthesis of two paradigms within contemporary philosophy—computationalism and informationalism - into a new dual-aspect info-computationalist framework. The dualism itself does not mean that the phenomena are separated, and exclude each other. On the contrary, they are mutually determining, constraining, and completely indissoluble. Structures and the processes are inseparably interwoven by physical laws, as described by Dodig-Crnkovic, and LIR gives logical underpinning to the dynamics of "interwoven". ICON, as a naturalized epistemological approach, it conceptualizes information as both here (intelligence), there (world) and on the interface, as information constitutes the basic 'stuff' of existence. It grasps many features of natural processes.

In the context of this study, computationalism as natural computation thus appears as an acceptable, natural philosophical component of a Metaphilosophy of Information as I have defined Natural Philosophy.

#### *7.5. The Logic of the Third*

In his approach to a Unified Theory of Information (UTI), Hofkirchner does not refer to the fields of philosophy or the philosophy of information as such. However, many of his concepts and formulations illuminate core philosophical, logical and ethical problems, in the context of the 'informational turn' and with a clearly stated objective of furthering a Global Sustainable Information Society (GSIS).

As Hofkirchner writes [15], a UTI should be a logical as well as an historical thesis, explaining not only the historical appearance (emergence) of new information processes and structures but how these processes and structures are logically linked. Hofkirchner explicitly excludes standard deduction as incapable of accomplishing this task, but LIR would appear to be an acceptable candidate for doing so.

His combination of critical thinking and systems thinking—of Critical Theory and Systems Theory—includes what he calls the Logic of the Third [63]. The (informal) Logic of the Third is the foundation of a critical social systems theory, in which "criticism is a method oriented toward recognising and sublating contradictions". Hofkirchner is an adept of Hegel; I will only remind readers here that real contradictions have a positive valence in Lupasco and LIR. 'Management' rather than elimination of them is my preferred strategy.

Hofkirchner states that given a society characterized by agonisms, legitimate agonistic differences can and do degenerate into antagonistic denials of the 'other' when social actors try to impose their own interests exclusively. This phenomenon can be considered as one principle of this Logic of the Third:

only the social relations that reinforce one's own position enter into consideration as a 'mechanism' that operates for the transformation of agonisms into antagonisms. The most important question is if and how a needed 'mechanism' of turning antagonisms into agonisms can work, how it can take the edge off them, how it can sustainably de-escalate them—a question to be answered according to the same Logic of the Third. A conjunction between Hofkirchner's approach and Logic in Reality is easily found: Lupasco's central 1951 book is entitled, in English, "The Principle of Antagonism and the Logic of Energy" [16]. LIR is, also, a logic of an emergent 'third' element in real processes and included without difficulty the real antagonism between human beings as logical in this sense.

Another classical philosophical problem, with which both LIR and Hofkirchner are concerned, is the relation between the 'one' and the 'many'; identity and diversity; and identity and difference. This is a key concept in Lupasco's dynamic logic of/in reality in which movement from primarily diversity or heterogeneity to unity or homogeneity was as fundamental as that between actuality and potentiality in the basic structure of the universe.

Hofkirchner proposes the relation between identity and difference as describing four ways of thinking: reductionism, projectivism, disjunctivism, and integrativism. The first two yield unity without diversity, the third diversity without unity. The fourth, as also expressed by the contemporary philosophers Edgar Morin, yields the necessary unity-in-diversity and diversity-in-unity. Hofkirchner applies these concepts to information in a doctrine of emergent materialism (EM) that goes beyond materialistic and idealistic monism and (even) interactive dualism. The dialectics of EM recognizes, like the theory of Wu Kun, the identity and difference of matter and information. EM is a philosophy of mind, "overarching all manifestations of information and not only mind."

Logic in Reality is compatible with part but not all of this approach. LIR provides a realistic interpretation of the physical, dialectical relation, a grounded 'interactive dualism' between identity and diversity, a unity-in-diversity and a diversity-in-unity as well as between the terms of other critical physical and philosophical dualities. As stated above LIR, in contrast to standard bivalent or multivalent propositional logics, it provides the basis for an ethics as the finality for the intellectual process, a principle which also pervades the work of Hofkirchner. It thus satisfies both my formal and moral criteria for a Natural Philosophy.

#### 7.6. The 'Incomplete Nature' of Terrence Deacon

The currently prevailing assumptions about the nature of information are still based largely on computational extensions of Shannon's original ideas, sufficient to explicate its minimal physical characteristics but insufficient to define its representational character or its functional, qualitative, and normative value. The biologist Terrence Deacon has proposed a new approach to information as a process instantiating a complex dynamics that starts with thermodynamics and continues throughout higher ontological levels of form (morphodynamics) and intentionality (teleodynamics). In his *Incomplete Nature* [14], Deacon extends a thermodynamic concept of energy derived from statistical mechanics to yield a complete and cohesive description of complex processes, in which absence, the fact of being not or not completely present, plays a critical role in the emergence of living systems, mind, and information.

Deacon shows the central role of negative relationships defined with respect to absence. The concepts of information, function, purpose, meaning, intention, significance, consciousness, change and human value are intrinsically defined by their fundamental incompleteness.

This is similar to the LIR picture of energy as an energy-matter duality, with a critical role of potential as well as actual properties of processes. My own presentation of a concept of information focused on its dynamic characteristics—information as a process constituted by energy but carrying meaning [65]. Deacon shows how the operation of both Shannon entropy and Boltzmann entropy must be taken into account in information, and Logic in Reality (LIR) further suggests that information involves non-Markovian processes.

In my 2012 paper [28], I demonstrated the complementarity of the LIR and Deacon approaches to what is not, or not fully, present—not “there”—in gaining an understanding of the dynamics of complex phenomena, especially, of intentionality, information and ethics. My own presentation of a concept of information focused on its dynamic characteristics—information as a process constituted by energy but carrying meaning.

Deacon showed that the key feature of information is its absent content, a resultant function of the necessary physicality of information processes. LIR shows that presence (actuality) and absence (potentiality) in such processes must be related dynamically. While the importance of a concept of absence for information was indicated by Marijuan 10 years ago, it is Deacon’s detailed current development that now calls for our attention.

LIR provides a necessary further *validation* of the role of absence as defined by Deacon, in relation to presence, and prepares its *valuation*. Valuation of absence and negation in general is logically equivalent to the valuation of the other, immanently. Thus in addition to explicating the evolution of complex processes, Logic in Reality, unlike all standard logics, founds an ethics and this implies, today, an ethics of information.

The work of Deacon and Logic in Reality share the ontological feature of being firmly grounded in physical processual reality. The latter enables a critique of the former such that principles of the combined theories offer a new platform for progress in the science and philosophy of life. Meaning, morality, emergence have their own logic and real dynamics and do not need to import natural philosophical principles from outside of physics. In more recent work [66], Deacon and Cashman explored further the philosophical implications of absence as incompleteness, emphasizing that it is a necessary component for the description of a real world that includes meaning and human values. I thus see his work as a major contribution to a new Natural Philosophy.

## 8. Conclusions

The theory outlined in this paper starts from a logic grounded in science and applied to philosophy. This non-standard logic of processes in/of reality, LIR, is a rigorous alternative to bivalent or multivalent propositional logic as a requirement for a valid system.

LIR can be a method of distinguishing between Natural Philosophy and philosophy *tout court*. It is based on the assumption that energy deploys itself in all existence, in particular in human existence and complex cognitive and social processes, in a movement from actuality to potentiality and vice versa, alternately and reciprocally, without either totally disappearing, except in trivial static cases. This logic, which I call Logic in Reality, supports and is supported by parts of doctrines from many different and disparate sources, including some of the informal perspectives of Eastern, in particular Chinese world-views. This logical approach establishes non-separability as a basic ontological principle and, among other things, supports the role of ‘the other’ in society, an argument in favor of social-economic justice and the common good.

The domain of philosophy-as-such, ‘just’ philosophy, as a separate discipline is best directed toward the study of general principles, such as the unity of knowledge and speculative, ‘fundamental’ questions such as “why is there something rather than nothing?” A characteristic feature of such questions is that they do not change, although an individual’s interpretation of them will obviously be a function of his or her context. In this domain I include apparently dynamic theories such as category theory, semiotics and quantum-type logics applicable to macroscopic phenomena which in fact retain the principles of standard propositional and mathematical logics. Their capability of describing the ‘interesting’, that is, interactive, changing and moral aspects of phenomena is accordingly limited.

The phenomenon of human and animal consciousness is placed squarely in the domain of Natural Philosophy. Representations and beliefs are natural *qua* the mental processes from which they develop; they are only pure philosophy with regard to content, even if they refer to real objects and can be verified *a posteriori*. As in the case of organism evolution, it is only by examining the dynamics of lower-level emergent processes that we will be able to adequately explain the sentience, representation,

perspective, and agency that are the hallmarks of mental experience as a dynamic process. Rather than being the ultimate “hard problem” of philosophy and neuroscience, the subjective features of neural dynamics are the expected consequences of its emergent hierarchy, as discussed by Deacon [66]. The so-called mystery of consciousness may be a false dilemma, created by our failure to understand the causal efficacy of emergent constraints.

I have addressed two major errors that have been made in the discussion of lived experience: one is to ‘bracket’ it, following Husserl; the other is to deny that it has a scientific or at least regular, partly reproducible properties, structure and dynamics. The anti-scientific approach had perhaps the laudable intention of avoiding reductionism, but it lacks the necessary coherence to function as a guide to ethical behavior. Transcendental intuition is not a concept within Natural Philosophy as discussed in this paper.

The formulation of LIR does not preclude and welcomes the development of alternative, opposing logical systems, in which some logic is explicit or implied. I have suggested elsewhere the work of Derrida [67] on “grammatology as a positive science” and the process philosophy of Seibt as examples. However, I cannot accept as candidates for any such newer, expanded theory those which aim at some absolute truth or certainty. My ‘philosopher’s stone’ tests for the absence of pure concepts, conceptions of pure ‘things’—identities, static concepts, and unstructured diversities without a minimum of self- and hetero-organization. LIR seeks the presence of physical processes-in-progress, all of which are meaningful and capable of being re-cognized as such.

If one accepts that Natural Philosophy should be a coherent but dynamic doctrine with the above properties, capable of integrating science without falling into ‘scientism’, Logic in Reality is a tool for achieving this ‘naturalization’. Accordingly, I look forward with great interest to reading the other papers in this special issue and the revisions and additions to Logic in Reality, as well as other ideas that they may suggest.

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